

MICROMACHINE THE TECHNOLOG OF TININESS

A NEW LOOK AT BLACK AND WHITE HOLES, WORMHOLES, AND HYPERSPACE

YALE PROFESSOR TELLS WHY EINSTEIN IS OVERRATED OF THE YEAR

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PLUS: TV FOR THE BLINO, SUPER TERMITES, LIVING BATTERIES, UFO ROBOTS, DREAM TELEPATHY, AND WOMEN WHO RAPE MEN



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ONNI



FIRST

By Kathy Keeton

Warran's superior reflexes and endurance capabilities will give them the edge as the spaceship drivers of the future. The lanckage with label more year address of the activation of th

The period page and before to young and house to account of the period of the period production of the period of the period of the production of the period of the period house the period of the period because and when the document to period because the period of the period of the cardinar Sharback, one page 501

Hursan entryce have in five: bain finemer and newel At the Royal Files Phagalis, mit London Englandt, entryces are being cryceptinosity preferensed units respectively there of and impainted in a somain's worth. Pernele pomenti and on the watering that for sealable those anatypes the advent of the procedure may be as assist, as send year

By the ms1-980a, sait lube incommitted isolid be particular, meanwhite, boentet de obsety working on an artificial work! Within a clicicale a wernan will have the option of watching her fetus meture in a controlled external emissionant.

The next generators will also be able to choose the sex of its chiefere more reliably. Already and esk association matheat developed by Dr. Bankid Ensore, in Californa, crables a couple to have a 76 to 80 piecert success risk in cheating to large a mathe child

What else besides these reproductive breakthroughs can a worsen of the status expact before the next century?"

Well sho I know more assuredly whether in the row grants of the calcula at large that is reaponsible for certain of her actions: Reports on these them chemical Hannic Kah Terminas reveal har many of our feeling and to toteors may be orcheted by a requestly reclarent beyene balance float diffy in working As the cases of dire behind the termite present balance that womens cultural status and self-esteem will more admitted by

 Recent brain studies support psychological relations that women and batter at communicative skills, while missihype is catarior batter for solidal lises. Though it was braid/orally between that computer expertise demanded lises and/youse skills, withinke hyper Table understanding and programming a computer size skin to kenning and settimate the second in this burgeoning held and by the end of the 1980s, when a 50 percent rise in computer-related obs is anticipated, women should play a key sole in the next important installary prevend sizes this and of World Wari I.

Basea will provide women with another takes to project accessive, addent and a program accessive, addent and a nature accessive addent and a nature accessive accessive addent of the takes and two will give heat takes and two will give the takes accessive addent years to support to any encode addent accessive accessive addent addent and supports any encode addent and supports accessive addent and supports accessive addent and supports accessive addent ad

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Robert Wei is the effort of Oren Press which recently copublished the Oren Kates America with Hermony Social (Clobbar 1964) Har were a minicale baby of the model of the second and the oren of the model of the second and the oren performed by Dr. Leadow B. Steedes one of America's more contowerses micical powers. Their and Perside Despress mither the vasia the minimalas Verpais (page 50) is a personal objective mither the vasia the minima-

Since the lass 100ks therefore has straten to alter nature s course. He was the free painted to fersion is human engo outside the body. Armat singletainciedly he popularized ones relections with the publication of Your Beby 5 Sex and Choose Your Beby 5 Sex Sherther's lixitmicate there strated on relative a size. often provoking violent onticism from many quarters. At sevenny-three that embattled cloctor continues to pursue research in cloning and embryo transfer

The resolution of two parts in the second sysphere parasets in the second system of the second communications applies as it because and the second system of the second communications applies as it because and the second system of the second influence of the spectra of the second influence of the second s

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Bob Cectoria (chivenen of the Joard) Sathy Redon (pricaded) Drivel J. Nyereon (precided vice-precideo

Maratte Howston (senor voc praulied)

COMMUNIC/ATIONS

Conouterheads

Why dol Chimi come out so headily in Band all his ways, Tahri Tuni way just arothar of these polisions type lims to belligated sources and the source of the belligated sources council with a wat match by a blanch of computer with a wat match by a blanch of computer with a wet couldn't go two runds with a wat morkey. The gray who madch that by to portag themselves as some kind of heads a limit of any sources with not by to portag themselves as some kind of heads with not parts are wand see.

> H H Cleaver Alfmington, N C

We interest in the firm/less realm of controuter technology was been sparked by Omn/'s coverage of the move from This coverage of the move firm that/interest calverture terminals me of hat/interest calcolor to experimentation Yppoe for creative parcels with determination!

Berbera Biddick Oakland Calif

Toe Activity

Electric Toes 1 by Owen Davies (Antimatter July 1982), leaves a grazit case to be desired in the technical acourticy department

Biel Internetment have websat (second bield internetment have websat) free the second second second second second existence that the second second second existence in the second second second existence is a second second second existence is a second second second conductive had social second in second second second second second second second second second existence is a second second

The use of this device would seem to be as diargerous as poking your tests with a table lea

Darrol Kotsey Mendola Heights Mirit Dwin Deves replies: Comptain to Underwritans Laborationes: Mr. Pheam says that he consolided them about hes device and was warred that it could deliver a potentially leftial electric shock Who am it is aroun?

Puspets for Zero C

Ommis article "Flight of the Stars," by Berbara Rower (August 1962), was interesting to me in that Archir C. Clevies was included because he is ao intellectual, yel Minyl Streep was turned down bacause whe in "too intellectual," as opposed to Kate Jackson, who is maney "perat".

I note that of the two women included in the list, one is an across and one is a pupper! No world leaders or scientists of the lamate sam need apply, the sign in NASA's close must used.

Columbus Ohio

Omn's choice of Sension William Province as a passenger for the Omn shuttle is excellent. However do all of us in Waconsin a favor When you get him up there, leave him.

Peter Passick Muskepp Wis

It is interesting that Orose feels Stat Paire Trudews vecida be a good condidate for a trip on this space shuttle Judging from the excitement about the TERF (Trucews Lerify Retented Flund) if geoms to me that many Canadiante truts Trudews in altered/load in goode

As for the stallement has a space shuffle hight will inspire Trudeau to lead the space cause on Earth, well more incredtals things have happened. I suppose them theme

Tecewater Ont, Canada

So Dmin wants to send Reme Trudeau into spece wh? You and a lot of western Canadians! How much for a one way Solict? If we have any money left over we'll and McBachen, too!

Emply Mconstatt Calgary, Alta CanadaDO

DIALOGUE

FORUM

In which the readous address and correspondents discuss theses and parculatable along out of Omm. Readers are incountiged to discuss views and pose greations to Omm. The countific community and the science-licition establichment. The opinicial published are not necercipate shore of the entities.

10000

We Michael Edebart's proposal of triage as a postisitile solution to many modern problems (Continuum, August 1982) sets a dongenous precedent for a magazine such as Occas which detinguistres feel as a forum of progressave and enoverne therway.

Nuch like many of his survivalist alloss Wr Edahait attampts to condense il social waveneess and human complastion #to a wholly allen dogms in which his strives to find a domeneet artiwe for all the diemmas that confront metricol today.

The still codes of thinga would arease for humane and ultimately democratic process of decating each case according to 30 en metric and spical conditions. What is especially disturbing to me in that have assess to gen from Mr Explant 15 port of view a pervalues shift from our own ability to at not line in individually to a mian worship of the arthose intelligence we have created.

Linge Omini readers to setue the abariment that "organized settimenes is the only way to survive and show a concern for the greater good and the further progress of menightement evolutionary quest for enighteement George Publicat Vectors B.C. Develop

Mee Edelhart replets Mr. Putanoh may be surprised to know that i agree with him The problem with playing devid a advocate is that sometimes you get identified as the Devid

In sure I would be no happen in a socially that relied on triage than Mr. Poharch would be lost as a reporter I must discuss the very real possibility of di accordingen.

NA CARACT

Lona: Decosaur Kaler

Since the discovery of the earth 1 motume layer and is comfaining with the existing of of the dominant life form on the planet been secriting for the metor cular that could have referend layer quantities of indian-rath cular into the earth i stimupping to the metors the earth i earthcapt to the metors the earth is earthcapt of the antice to the mode earthcapt of the conserve has yet to be found.

But report has the medior instead of of striking the author by the the more. When evidence at their thirt hypothesians (20) this the craft hypothesians app Techno the most recent large craise on the more, more (prorespopsed a pose-thir inguid: Persisps members metric council a striking and the backade hypothesis the method backade hypothesis the striking and the strike hypothesis the striking and the the the back the the striking and the striking the striking and the striking the strikin

Norman Campbell Glascow Sections

was and Technology

One does not have to bok very tar to an answer to Ban Bowlis question concerning science and technology's role in time (inner Word, August 1982) In an intervalue in the same acust St John Hockett statos. In the last resort, the Hockett statos.

the product of a practical mind parts a small fraction of evidence.

Although Mr Bowa is complexit that science-fiction titrs are writechnology may have some ment he really moses the poet.

In this Star Teek examples Mr. Been minks an includual is doceann saching capabilistics tolely on the includual tinks ranovally. But Hartan Elision and others, when which Star Teek scripts siccepture that there decrean meking is not small the assemblates of tiers. A leader must know how to understand and interpret hosts. The characterial Capitan Kis must be logical (added by M° 5004) but her must also logical (added by m° 5004) but her must also be anamtree The observation of D° MCCoy was introduced as a men who here purely by his emotions to show his contrast to the better must define the sector on the one characteristics needed for good bedrefering into and scenarios.

For just this tension. Holiywood plays against unimited technology. Technology is line but its application must be handled with care.

> Steven King Washington D.C

I think some Hokywaad movemakers may hava a bother understanding of merioad that Ben Bore has be Wr Bova chicase them be creating characters that abandon " a rational intelligent mode of belawior" and then the creates some examples of hims that apprently represent technology as will

I agree theil many current films have welly thild entiticatal content buy Mr Boxe mesod a key truth. Nariking has an incredible and besulful abetrace is as mere ching and excerning as any interlicitual eleverose. It is what allows us to identify with chalacters in movies and is a what allowed Mr. Boxe to appreciate the appreciate the Bandford

David Hague Troy, N.Y

Noteen: taxitation has not yet understood, not come to graps with sceneroe as tilee. Bove points out in First Ward. The 400-yair out scenthic revolution has yet to make no mak on the cubarts the model of the world. Our full-use are still based on remaindent out based on oncosts within inproved, our based on the significance of the indicators and significance of the

If someone in Moveland with the heart and the brains would tackle science realistically it would soon become evident that every problem facing our ovikation contrarchipsions re-

COLECOVISI The Arcade Quality Video Game System

This is

The Most Advanced Video Game System

ColecoVision was designed for what you had in mind-a great pame system that's expandable into

Arcade Quality Graphics

ColecoVision graphics have the superior resolution and britiant color of real arcade games. And this new advanced level of quality holds true for every

Plays The Best

ColecoVision has arcade quality controlsloystick, fire and jump buttons that make if easy to play. And ColecoVision offers a Inbrary of your favorite arcade games like Donkey Kong (which comes as a bonus with ColecoVision), Turbo, Zaxxon and Cosmic Avenger, Sports and educational dames, too Even ColecoVision's axclusive new Smurf game based on the #1 TV cartoon series.

Plays The Most

CelecoVision plays more games than any other system, because ColocoVision is an expandable seriem. By using ColocoVision's first expansion module

An Expandable Computer be and a sophisticated by bought a sophisticated uter ready to accept expansion modules of all kinds. And in 1983

you'll be able to "activate" ColecoVision's amaging memory by simply plugging in a keyboard, a Drinter and other computer accessories. This expansion feature is your assurance that your ColecoVision will always keep pace with "state of the art" developments in electronics.

ColecoVision~a great game system that's expandable into a great computer system. The most advanced video game system YOUR VISION IS OUR VISION (A) COLECOVISION

both been waiting for

ColecoVision has werything ! It plays the best arcade games-It

Lotes and place just like the real acede and if plays the most acede games stinget a play in attachment

that will allow us to play all of

P.S. and look at this, Dad,

Coleco Vision is also computer

knows, & down want to gut fly granes Could use go to the store and take Ind that important - because you

ataris VCS games!

MAGMA POWER

EARTH

By Madeleine Lebwohl

In trace to the second second

But deep under his quiet Califormi volley is witrigent of mobile mock snakes toward the surface in 1980 the sodding motified had been six miss below the terrestruit floor, by 1981 is had rean three miss linera. And been six miss below the geoscientistic withing the vollation regen tell the rumble of magma surging upward yet again.

Harry Hardee of Sandia National Laborations in New Veteco was standing in the Marmoth Lakes approximate the borning took began for nov. If it was shot through this ground, he and his colleagues routed it might orugit in evolcano far more developing their the only that lake the too of Mourt's Likeling.

Hardee had animed in Mammoth Lakes spechastly be tauty be segand magnetic pool just one of hundsald of such bodies solatered houghout the versioner United States These bucklefs charateas of sock he invest had anough hold energy to fuel our entities society for millereas All haddee and his investmic process back in adjust is impercised with anough the optical depart impercised with our entition the entition of the

Ever aveca he id begun this propert in 1975 Hardee bad realized this success would negate some extraordinary both call laps. No one hence, for instance how to dril through the gut/sker magma, which shad gut-mad up every bit of machaney ever applied to it. And if a how could get strike, the heat ensure would be it to witholend years of magma's evenders organism.

In an effect to overcome these difficultes. Hardee first imported hardened lave (migms that has rean to the earth's to devi surface) from the volcances of Hawaii He meted the rock in a huge laboralory fumace and inserted various metals to see which ones might withstand the stress. Ordinary stanfess steel. he lisemet. could do the trick

But Handoe hout to be sure that storkeds doed could withinsol the restrict to be of moutain hout, not pair material melted to the bab Just as impostrat: the wall had to see whether he could shill through magnets and bennips to wait to be autilized could be any store to be could be any store to be could be any store to be respect to the packed his bags in the hours that and caught the inst plane.

Hanka all reads the morring he amend at the volcards edge Fourtains of ned-bit next that the bar wild sky and sected down the cliffs. When he hired uphil, he bund a 2007F ner coursing page to base. Perigning from wakts of powerful valcance heat. he ben to bar he upments with the flat.

Rock melted by the informal heat of the earth's interior he soon betted.



foreir born bie boreals of the earth

do is deed behave much tike makinal in the lake. Nalassi lake disht discht y stamises steel. Purthermone if secret do socialist with removal efficative sa always in contract with the mest. The teach is the set bhouse it cooled handlend is these bhouse. Tooled has handlend is these bhouse of the density it sets in the bebaro of the characteristic allowing food, nergy-interces methods way up. The virtually and contracts.

"Hardies internet to Klassa soveill time dang the nex four years. Finally, in Agoi 1981: Its and his learn powed they could suit through mohan tock with a diamonol-spaced all that should all the diamonol-spaced all that should be hald 332 feet deep. After the materies is the persphere yor the table hald could to 1300⁻⁻—a temperature low encough to salar the group preptied water and water the materies in the perty solid—integ space preptied water and solidan spacehilter all.

The peet among this way and this means the goop divide to Mammoh Learn Thomas to Mammoh Learn Thomas to Mammoh Learn Thomas to Mammoh Learn the the second this determine the exect houting of the magnameng tak beneal hearned the magna means goot benerath Mammoh Learn and elsewhere, hery I make their special claimort they and their make mock and insert resistant starless see hates

If all goes well the magna will boll water pound down these tubes to generate high-grace steam. One day soon that steem may tum a nearby furthine, providing electricity for thousands of factories and homes.

that a few years ago. Hardee says the soncept of harvesting energy from motion nock was pure faithas? But if the progress made the past year is any indication magita may well be the fait we devend on the views to be the Date. Date devend on the views to be the Date. CONTAMINATED SCIENCE



By Owen Davies

In the second se

The cause is delective research mixingles manyper ince told as genotacity pure varies continemated or molobiod of outures, and an aniar varies to the variesty Many conclusions of the coertaits infore processly the genetic mixing of their research subjects particularly when their notably the particularly when their notably the and proceivergetarte mixingenet.

No one knows how often tatel titees appear, but it seems certain that they are far more common than most scientists schrowledge Dr Watter Nasco-Ress who recardly rested trant the University of Cofformis Neural Baccence Research Laboratory in Oblights, baccence Laboratory in Oblights, baccence of the Contrast Laboratory in Contrast of contrained Laboratory in Contrast of contrained the Contrast of Laboratory of the Contrast Laboratory of Contrast of Laboratory of Laboratory of Contrast of Laboratory of Contrast of Laboratory of Laboratory of Laboratory of Contrast of Laboratory of Laborato

The trumph made Dr Long's reputation and seemed to give Hodgfan's specialists an important new tool

Then one of Long is experiments persistered integrity so odd het at leading solarith parmit systeric hin regort just ware solar than the solar pulsage seep hasherdity and yet unbible in segart task he forged dats that won he supports and solarity and yet unbible in segart task decounted like in bidlegaters was decounted like the tooptid on the stepartol. Table yet and a solar testanth. Table yet works as a mental and tooptid in the Welest

Long is departure of one end the matter however, for behind him he had left a markery he more important than his fraud. Were his cuttawas needy cells obtained from Hodginis patients? If not some hundamental insights into the observe would have to be inthrought

Dr. Nancy Heins, who had worked with entry on a previped to in year biowartip wate assigned to hird out. It back has an anathan the transitivagin caree when Dr. Nataon Hease managed to confirm the subscools Not outries. But three of the biologine with the source of the biologine of counties to move holds and moving. Local data managed the original cubures with olds from most in the indication and and the source on the source with olds from most in the indication and and the source of the indication and

In all it was a costly error Long's creater web last and was a bit move than \$200,000 in research funds spent balans his deception came to light. And then there was the fine-wave period in which his error may have mixed countiess other membergies.

Dr. Hanni & future in readerch may also have been jeopardized. "I had only these two years in which to carry out readerch without chinaid dutes," anie ages. "Since then I have limited mysel to working with pathots. I have not applied for any funding. I spart two fut years correlated over no



Mice identical to the type, but genetically impure /baled materialism and yielded toutry langes to DMN

SERAMJETS

SPACE

By T A Heppenheimer

Provide the second participation of the second part will be a side to book you on a second part will be a side to book you on a watchen light to book for care space. The breasthrough that will be listed the writing a sine well be side of the society of the second part of the

Picture your flight

Waking to the departure gate yearlipars an old Boerng 747, perhaps just in on a nonset plagt from tokyo or Rome still doeg viennan alevale aller meni the half a contray. Buint will seem primitive and small near to your own anosht a steek black plane with defails wrings nearly the size of a football held. Your craft is normad Stan-Alvaer.

After Star-Relea taxis to the main neway its tubofons vestiges of a previous century's sincerf design numble to life. The crist accelerates allowly made ponderous by 1 000 toxis of fuel but it gathers speed and news. Until Star-Reler taxihes chusing alloude yours. motif seem like sist an ordinary flight

But suddenly the where of the toto/area is chowned by the rear of a laverty-fratcentury antiresthing engine called a screampt. Now the stop come slive, and the cloud layers tail away on the cabin bulkhead, a digital Nachmeter displays the screed Wach 4. Mach 6. and hoher

At 130 000 feet and Mach 12, halfway to orbital velocity there is another flunderbus jot as rockets kick in for the final boost into orbit. The last stage of the trp takes privial few minutes.

Much of the technology for this yetrectilet fight a already taskible What remetion to bout it all agether Designing a workable scrampt is the primary task and this will require powerful computers sail on the drawing boards.

An ordenicy subayet connot by leader than Mach 3 these tries the speak of sound. For a lurboet to burn is fuel, the incommo ar must first be slowed and compressed. To accomptish this the tuboet has a carefully shaped inlet channel that careful shaped inlet channel that careful shaped inlet assaring through the Shoba mideol slowed.



Tourist detarring Stati Raket uses jut and rocket power to climb to orbit from export takeoff

but it is also compressed and heated, and the heat grown interest at high scheet Above Mach 3 the heat can cause engine parts to welferin To reduce the temperature a digne designed have to to avoid compressing the art as much But then it fows at higher speeds, and the tarbagets including fand or compression can't work property.

Entryptic car overcome the proteins but only to a degree. The structure type of all new mail, if there as they append and the mail of the structure type and the mail of the contrast structure and comparements of a converticion) and teamort these of them the proteins it there are the top the structure them and the structure of the contrast structure and comparements of a converticion (all teamorts the of them top the structure there are the structure of the structure tables of the high them and them then a tables of the high them and them then a tables of the them top the team of the team protect and the structure that the team tables of the team top the team tables of the team top the team protect and the team of the team of the team protect and the team of the team of the team protect and the team of the team of the team team of the team of the team of the team of the team team of the team of the team of the team of the team team of the team of team of the team of team of team of the team of team

The enflow in a competituat cell be subspace or two block out the flame. Again it is shock where that slow and compress the outside arrive to the desired internal speed Though sive base heating is produced a la stript can be cooled by routing the first arrow of the combatters in case engine. Above Noch the combatter centre of the set (see with site strategy fails. The need for autoenc comburger inthe the perform autoe of needs.

Since the tate 1960s it has been known that if a namer could burn fuel in a supersone allow it would give much higher flight speed and better performames. Foul it worth hydroget and such a supersone-combustion name? or sosame! would be a lot more soonomoel al Mach 8 then a conventional turbopet is al Mach 2.

The most important difference between a name and a schampt a the difference between their feel nyectors. It's easy to import fuel into a subscrite arrive in mission is the christian state of consumportance in consumportance in

OLYMPICS OF THE MIND

By Joel Davis

the high-policies when the inductors of the Exploration Vehicle (EEV) roles across the Bri androscope Careford's extension analysis an alternative and the Executing is metavanual with the Executing is metavanual with the Executing is metavanual with the analysis and drops in the assigned case, need to an orange Them alternets that the daway when a control. Soon they will have to neurin home active To boost by will have to neurin home active To boost by will have to neurin home. Theme antiperative have alt from

archine planet bet from Perstand. Orogon – McLourie Junne High Scheel to be event. They are participantis in a orogale compation called the Dymoics of the Mind or CML Last spring the locgith. Amount a form, Temphale area with hundhoods of other youngsteam, mixed a optimizing to dissibility to compete in socitivaciani New Jestiya, to compete new social watching the mixed to the straight the new social watching to the straight the moves observation. The shall the again the other of the straight of the participants who ranged tom the benefitient. A water to be Galashon campair during one of these comparisons would likely base soon crows: or eager younglens gang time one competition to another in the actional: gene and subcert center and costumed as everything time an score if cigarent to a centerize from outer speake, all part of a somewhat theating) and board event

Just a title over faur years old the Opmanics of the Mail during that a great hardwork of the second second second second textures that a second fault during a to focal, and take traditicities and second second second second fault during a second second second second fault during a second second second second fault during a second second second second second fault during a second second second second second fault during a second second second second second second fault during a second second second second second second second fault during a second fault during a second sec

The Olympics of the Med began in 1978 as the brainchlid of Dr. Samuel



Overprise of the blind coverprises. At last is reduced compatition for the intellicitually gifted 24. CMN

Mokkay a Okesbort State polessor of matasma desar, and Ted Gouries a director of pithol children education for the state of New Jensy To Stiff Ade Ins students clearby paces Mickus often gave there excrusions that adead them to solve complex prohibing with simple clearonom exercises that adead them to essign a complex prohibing with simple clearonom exercises and asked Mickus or design a competibility for students in the New Jensey school system, using similar challenges

We did if as a one-tese knd of thing, says Caro Micklus executive director of the program Tour is got so popular if become a young worth. This popularly has growe arrow Lazy years if QM regionals in Portand were the first of their kind on the Weet Doald

The Diympics of the Mind is a sort of problem-solving bowl, says regional coostinuation Kinaly Clark, "More than two hundred children entered in three age groups from iondergationers to high school serios."

The challenges outlined each year as geared to different age prouse for somple, less year thay include. for younger participants something called the Cruppets (foungitters was alked to write and perform a stort play with five rouppets one of writch had to be modeled their is oxistently Dolly Parton was one suggestion.)

There was briefs (Fields in which sade isom hard to called galar suggest (poppen Narmeis) hard there of the a timological calles in method and of sime film unlike which backing or speaking to the challenge register different the timological calles which backing or speaking to the challenge register different to device one hard of orosofte autoone hard of orosofte autocalles and the bank to device the second the bank to device depend for example—to guide the campet and second and guide Charl in Answer tangs and met good. Charl

The older children had challenges like Earthquake Structure. In which they were asked to build a structure, coing bats wood strips, that was no taller than commute on hold will WHEN WOMEN RAPE MEN

THE BODY

By Albert Rosenfeld

In word age almost unversally portides man steasuring women As an afterthought are main based the definition to loade main based for an afterthought are main based for a steasuring main feating main 2 when in abilityor yeap, where no before a used in bare of 11 abies on the before a used in bare of 11 abies on the before a load. In bare of the stease and the before a load in bare of the stease and the before a load. In bare of the stease and the before a load in bare of the stease and the before a load. In bare of the stease and the before a load in bare of the stease and the before a load in bare of the stease and the before a load in bare of the stease by makes

Yet women do nage men. This is the conclusion of a Hilfs-known paper by poniet sex Heteloches William Mostros and Virgina Johnson-Maetern Beendes privars that the particular sex act is physiologically possible, the insights gathered from the subury of male rigoe may offer some unexpected solace to familie rigoe votimes. (More about two laws)

The varial registry of such assess into near registral association (a) Malassian and Philip M Statel of the Visia University Philip M Statel of the Visia University Based of Malassian (d) and status (finisher main registra) (d) and status (finisher main registra) (d) Cr. Am Wabert Stategiese, di foscioni University writing in the Amesona Assess of Psycholary water main registra (d) and operative states and by other and operative states and by other wild registral states (d) by the visibility (the vision of the states (d) registral states (d) by the visibility (d) by the (d) by t

may not fail in the sime category as "I was taken aboard a UFO by ittle green then." but the inferent implusibility of the plaim regit restriain over a breggart.

Dreating in spectral who wells to Masters and Johnson for Minagow-long after the last, and then only because the well-was treatments of hum lated by the well-was treatment of hum lated by physices about what had caused the negrit was about what had caused the negrit main related with the master such oppose another of bland. This mich when he and her wells came to see Masters and Johnson, was hithy-even years did How could a man perform under such advante cocumitancer/ We have all read case lakense or heard stores about make rendered importer by even more distraction. How then can a man perform solution the New then can area perform solution assumed negative assess at the with assumed negative assess at the with assumed negative assess at a what casehold the myth of men's unrappolitio by exemen

Ni if appears that a man is capable of responding, even under duress in an article in the Archives of Sixual Behavior, Same and Masters one a number of 106-khown research vecome confirming.



Repairs lavelying no matter who repeat whom

that makes "have responded servely to firmale account or abuse, even though the makes' encodence states during the indestations have been overwhismingly negative—embergasment humilation attestiv. Next, account, or even terror."

The study polytops not be too trapmising in we of reports by many women vocams of reports by many women vocams of reports here here been setunded and charge were here by a study of the spotteric of their lenging of the spotteric of these vocams will ad control in the ladings of Matasta and Johnson and Sarrel werby many and polytops and a strange werby many and polytops and a strange werb control women and and employ and potrant while the small and employs an end of their beat and an

Addition mate lapla vicini what ultimately addition material law benchmarks and period for used in the law benchmarks and the law benchmarks and the law benchmarks promotion. But he wind own prote with a semantic head product (and its benchmarks and the law benchmarks) and the law dimension back and the law benchmarks and the law benchmarks and the law dimension back and the law benchmarks and the law benchmarks and the law dimension back and the law back and t

The period of forcible restraint and appealed sexual asseuts continued for more than 24 hours. Finally he was taken by communication-wall taken by communication-wall taken by communication-wall taken by communication communicati

FILM

THE ARTS

By Brian McKernan

1 this day is December 1990, Devid Harraki nemerbes, data No bright Harraki nemerbes, data No bright coinst to lare the syst and cheat this spirit. It was corry entering Period" An Exercise and Enter plasmed through Cestors, machine-guinteing and the spirit service and the main with bount visits whose luggings contained with bount visits whose luggings contained the Super British Botimer Strive cameres

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The edition was to travel as sightness and lim halenceri using Super-8 move cameras which are by their nature and incomploadus and usually miscanauried as being 'magnifeetiond' or for use only by facurates

Spen all est intolocio E y Adora, and Attacki Te Contaco E y Adora, and Attacki Te Venti and a praedrogi a Producti anter veni and praedrogi a Producti antere veni and praedrogi a di cantenere e adotta controlo e to in ton regesto fa a succhata, ad a cantenere e adotta controlo e to ano e ton especto a succhata, ad a cantenere e adotta controlo e to year Spend e succhata, ad control e succhata ad termina deviriman Spend e succhata ad termina producti in store ad termina devitiman o to add explana ad termina terminal e in ad the exemption. Spendtimant for bata explanation ad termina production to the succhata ad termina production termina and termina ad termina production termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina production ad termina production ad termina ad termina ad termina ad termina ad termina ad termina production ad termina ad termina ad termina ad termina ad termina production ad termina ad ter



Super-B cartesia unade verpl housing it before you realize your personal vector—anywhere \$2 CAM

films as there are people to use it. Super-8 also has several advictinges over home video although it has not been unaffected by its growing popularity.

These services and being registered by the network of the services of the ser

With the base of a subschapts in With which is thread-as well bags utiliary star move arriadian work that be made former moves Britania Light Generation, regarded by many as the tables of documentally threadtables of documental of the soft (1970) commented in the early 1970s when asked about Seper-5 Tm silf or the Britin exclution as large as the Brits mind observed our with it."

The end ages Sup - 1 fitmates prove that the end forms care yield tag results. The Canadian Stackasting Compatibilith as appeal Super-0. If in unit ensample is appeal documentare it internal in both a way to familian and careful ensample. The superformation of producer Policies and the fit of the stackastic and the mentang bart and ensating and produces also of the mentang bart and the straff later and contability of contain and explanation. FANTASY

THE ARTS

By Janel Bladow

hose who deam by day are cograzer of many things which escape drase who dream by right —Edgar Allan Poa

Great inventions begin with simple devices: On-law and Wittow Winght waintaid to fly. Thomas Alva Educe warend to mod at night. Alvasander Gontam Bell warned to tak to people on the other acid to choro. Little of these fartances of tochorology realize that ther dreams would come true to such an ensemble wolld. Some such of the change of the sopanodo by other changes to popontions such acid to change endity field

Since Chroimas is a firms of washall finning. Gives choose to ack is the specified and creative thinkens to incluge in some centriculars weakpattering. We proposed this idea to them. Imagine flyow will, the notexatern meetine of syster findeat dearms, barring all physical institutors. Following is a semigral physical institutors. Technomy loads are institutors. Technomy loads are participan to account and machines participan to account and machines participan to account and machines.

Dear Santa Claus: Please send mit a typewriter (or word processor) that will put works on a torgen, and then paper part as I think them simultaneously, without making any markets. Design the device so that it will be sole to change the works as I change my thoughts, and then simply transfer the whole lot to the publisher's office, leaving a copy for me —basic Asmorp, praths aution

Actually we play "deam machines" cure a lot here streat if we dont ask Santa Claus work over know what to instruct his lide elves to ment

Here each three converts underwettle wates (1) a docte that can monther the activity of individual revery cells in a human base which having to be issended into the train, as electrodes are converted automation of harve state with molecular identifications the way a moreotecop new weak plane tatations. (2) a device that can convert the tatation electronic companies of basings in the electronic companies of basing in the electronic company and ideals emerge — Floyd E. Bloom, M.D., director Anthur V. Davis Center for Betwinion? Neurobiology, the Salk Institute: La Joba California

The stated thing to see in plants dyna in inferror (altranspin Win red) on back to a king gatewing share. This matches shared and wind the state particular polytoms and offer more are matches shared and wind the plants of the state of the state of the state of the state of the plants are state of the state of the plants are plants are plants are plants are the state of state of the state of

The only deem machine has really appeals to re a cost hoor record has fair minus is bother. Expension based on the set of the set of the book in grade school for instance that assist frammers the set of the set of the set of the set of the deem of the set of the set of the deem of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the deem of the set of the set of the set of the deem of the set of the set of the set of the deem of the set of the set of the set of the deem of the set of the set of the set of the deem of the set of the set of the set of the deem of the set of the set of the set of the deem of the set of the set of the set of the deem of the set of the set of the set of the set of the deem of the set of the set of the set of the set of the deem of the set of the set of the set of the set of the deem of the set of the set of the set of the set of the deem of the set of the set of the set of the set of the deem of the set of the set of the set of the set of the deem of the set of the deem of the set of the set

I have two disease. One is to bried a backmann that would gat up all the chilorotoiurens, chilorobarannis chilorophanais, chilorobarannis and other chilorophanais, chilorobaranis, and other chilorophanais, chilorobaranis, and other shicking Love Canst. The there is to develop a share that would needse houd center on one to se.



54 CMN

THE ARTS

By Charles Plat

claim at red eccepter, ad science, property packaged salls and so 1962 has produced more science

scientists for students. Others are so the difficult trick of being readable acquiste and attractive all of the same offs for science enthusiasts

that speculate about its tomorrows

travel, because recent NASA probes have handsome useful and fact-filled of the Kenneth Gatland and other conlinibutors every page, it's also highly authoritative

If you want is more modest handbook. restricting steal simply to the solar Patricia Lauber (Crown: \$1195), a very clearly written purde for processous lads of

neighboring planets in greater depth there's The Cambridge Photographic Atlas Taylor (Cambridge University Press beenthisione object photostachts of Marts text civinci precise datalls about 35 CM/N

projument of these silent worlds, making

Heidmann (Cambridge University Press. \$7.95), with an introduction by Carl explaining the subfieles of cosmology

Painck Moore Britain & crinderous personal approach. His The Umbickno Unverse (Crown, \$17.95) is full of Moore himself pasing beside large preces describes what we know and what were still queeting about stars cataries

Which brings me to Jorenny Bernstein His Science Observed (Basic Books



\$15.95) is a further collection of New scientists. Beinstein's writing is popular, perhaps because he portrave scientists

people behind the discoveries, I refer Envolventia of Science and Technology available from Avon in paperback and from Doubleday this year at \$24.95 in a initianced one another. Dip into this references from one name to another and vault pet a fasonating sense of science

Also by Asimov is Exploring the Earth and the Cosmos (Crown, \$13.95). This lat of almost everything, from bacteria to black holes. Asemoy's total recall of facts he's become less careful as a writer and some sentences are clumpy or even is all things being equal faster than walking (I don't shink he's loking)

in a friendly even humorous style. And Clertoon History of the Linwerse, Book One (Quill paperbacks, \$6 50) depicts in to the Assyran Empire Published originally science. "Our own cells carry mysterious little globs called mitochondria. Gonice

FUTURE FLIGHT RECORDERS

BREAKTHROUGHS

By Michael Edelhart

A contricted new type of highbox designed to preserve visit information about applian controlled optimum about applian controlled optimum big not maxip the lands of high data, as motide new in used but up to 120 parameters are find a performance it is a development that artifices solver and up are instantic to adopt

Investigation of the recent communicaplane catalogs. In New Clamp and Washington, D.C., were transpress by other catalogs. In New Clamp and the catalogs and the second second in the device module currently in use In these devices metal parts and the transport of a lat line is downor now Unrecord with the line is downor now Unrecord with the line is downor now Unrecord with the part of the second downor now Unrecord with the log line in a clame, were of what led to be a comh what the record is the line is subject to the Unrecord to line in a clame, were of what led to be to be from a clame were making a clinical to warpage and wert making a clinical to warpage and wert making a clinical to the second second second warpage and wert making a clinical to the second second second second the second second second the second second second the second second second the second the second second the sec

What makes this especially functions, to calket investigations working bit the to calket investigations working bit the V17880 and the regression complexed by the anoth the multiclassions in the fact that if the fact bottle in the fact that is the the the second and the the second the second and the second the second that downships the the second the second and the second the second that downships the second the second that downships the second the second that and second the second that downships the second the second the second the second second the second the second the second second the second the second the second

These find-generators solid status recorders have other advantages. They are less than half as bulky as scretch recorders and weigh only half as much They operate relably for about 20,000 hours (the oblast antheir new lights only Unred Stoces is a DC-3 with 85,000 how logged south recodes have a useful if o door 10 000 hows and require hequest repar. Because the new recodes held internation is silican memory chips they are immune to the mecuances the marks control is acceleration unsitiable acceleration and the southers perfectly And a \$10 000 to \$15:000 the computered recodes are no more acceleration international and acceleration and acceleration are not more acceleration and acceleration and acceleration acceleration and acceleration and acceleration acceleration and acceleration acc

The wat majority of American commercial pipe still have the outmoded sostable inconcise however and picetality will for yoats to come Even move shocking. The huge fast of commuter and business at incluse it has disposal of commitme at will the influence in our allow containes at the third output of the star colory is an output of the gass that often sines between toching a cheverant and commercial accentability.

"There is no quasitor" says Card Roberts ofted of aboratory services at the NT38. That both the digate and the solid-state recorders are infinally better devices than the cortach recorder. The solid-state recorder is precorder. The solid-state recorder is precorder. The



New April Necordary could mean salw skeet

requires almost no materization or is more accurate and learnats more information. It might even save aritistic morely by allowing them to build up data banks about thail performance and other facts that plates must be availed of the fact plane. But the sitters like to assume that plates like the sitters like to assume that they plane like to add the facts of the plane. But the sitters like to assume that they been set up to both

So commercial arms have neared al new recorders. Currently Federal Austan Administration rules reques (gips incontescion) in planea of meases har contined to liy after 1968. When the paticular planews built makes no difference. This means that a Boeing 123 buil Bit week offing fails a scratch escenter blockues the 737 model was flath-carthile on 1968.

Nearly every plane in Delta Ar Linos liked has a scraftch moorder. Will Oveered general manager of programs and performance explains. I't would be very imperiove to retrofit all our planes and we don't belt three s a need.

"If we begin to add new recorders and dan't retroft, Sheri we end up running with two diffarent systems two types of training two types of mechanics its all much more tocobe than it's worth

But the NTSB and sevelapate of rev segment Hamilton Standard and Spann disport Hamilton Standard and Spann disport Amilton Standard and Spann disport of the Standard Standard And induct in classifier and an afficial staff have and standard the admitted standard the scalar states at the standard standard the scalar attitude wort take not scalar the signard means wort take not scalar the scalar too body wort scalar to the scalar to the scalar too body takes the scalar to the scalar too body takes to the scalar to the scalar too body takes to the scalar to the scalar to the scalar too body the scalar to the scalar to the scalar to the scalar too body to the scalar to the scalar to the scalar to the scalar too body the scalar to the

Card Hoberts says that the new recorders eventually will be necessary whistiant the executivis of the arkness think. The new planes are going to be all electronic one notes. When planes compute the model when planes compute the model.



CONTINUUM

OUT OF THE CLOSET

C long ago, kny scientisk who clased to declars be used in interest in IU-DSL, parageportalogy on the Lost Neise monthly found himself optimized by the scienheise monthly found himself optimized by the sciencitation like (Indecla approximation in private and commucation). Biol (Indecla approximation) and commucations like (Indecla approximation) and commutations. Biol (Indecla approximation) and commutations. B

Now the door seems to be opening up Several reputable scatchic groups have recently formed to investigate just those frage subjects. The result? A new openings are not and some precision respect for the shuft of anomalies.

Invasigating strange phenomena is hardy a novel particuloss Postioni and all workaw with invasible, develope couvery creatures and Europeans long thought independent wave the subof parasitric document independent work in 200 advocated for the bow of LAgle France. This coertaits sometide advocated for the bow of LAgle France. This coertaits sometide independent and the from cure spoper. When an investigative commission advocative commission advocation advocation of the sub-particular advocation advocation advocation and particular advocation.

By the Natifiable cardiary people had begun to over-comparate for that closed ministic and/orders. Averably the technical watarday of appoplicity and companies many parate to beyone in plot about any hing. To accent the line between the manage possible and the real became hopeles by durind. By the cardy 1970a—0. The di unprestried extends to parate the manage and/order page accepted as lack the dread Bernuteh hample and the estimatements in Datavis of the Gooly?

There seems to have been a greated decline in analytical interface, any DEAL Khat, physicapp particescont the Salas unreaded in a set of the set of the set of the set of the interface of the set of the set of the set of the set of the reader set of the set of the set of the set of the reader set of the set of the set of the set of the reader set of the set of the set of the set of the reader set of the set of the set of the set of the reader set of the set of the set of the set of the reader set of the set of the set of the set of the reader set of the set of the set of the set of the reader set of the set of the set of the set of the reader set of the set of the set of the reader set of the set of the reader set of the set of the reader set of the

CSICOP certainly provided a valuable public service. but many respective disertinals charged that the debunkers had gone loci for it was impossible resourches saud for the group to invest spatie intervales importantly when it approached everything from a possible of everything actuation. To makes up for CBCOP's tetrags several sopenase have formed what they day are mass insufal groups already it every ing the pendulars the other way. Just last year, for instance softe of the ochtry's parametric academics bended together to form the Cryptozoological Boolety which weeks to probe such

Another in the set of the set of

Scenariterward arother group of eminest researchers formed the Center for Scientific Anomalies to study such subjects as ISP and UFOs. Founded by sociologist Marcello Truzo the center provides a pockum tor perchics and skeptos alive

Perhaps TV most significant new group of all houghs to allowing constraints of instraints (DE D all, inclusing constraints) topolytect Tampy Gold and Startbook statistican not positive downing fields (DEC) all framework de surring, her do constraint field (DEC) all framework de portal. The biologies open indefinities and all peter-traveled portal. The biologies open indefinities and all peter-traveled portal. The biologies open indefinities and all peter-traveled portal. The biologies open statistics and all peter-traveled portal. The biologies open statistics of the peter statistics of the peter load different Peter Statistics who asserts that you cannot acular to public of you end of while to explore

All offit mitters for in this basis logariting, but has the new percentage stability being to the "Check spottism". But has a high percentage stability of spottism in the spottism of the high percentage stability of spottism of participation and high percentage stability of the spottism of the subtrant of interval carbon stability of the stability of the subtrant of interval spottism from the spottism of the spottism from the spottism from the spottism of the spot

Dent expect too much from these tentative beginnings hou won't be studying Bigtoon it Zootogy for But oo took for a new unitmining willingness to study strange phenomenal even within the most sonolarly of halls. "Without such torums. Peter Surrock was a vou nestiv can to be cancer." —DDUGLAS STARM

CONTINUUM

DELICIOUS RATS

It has beady eyes and a long sail and were up to 0.20 pounds. And it hashes delectous, The wild come rat, the world's largest not may not sound alticative to Americans. but in Africa it sets for more per pound than beef pork or lamp.

In an effort to captalore on this gourner celebracy, the government of Ghana hits soll up an agricultural reclargin service to on courage tarmers to rear the spoces in celebrary. Breacing stock and information ase furnished, and three is a central choic for records

According to University of Wiscorrist acellogid Stephen Gartand, who investigated call larming on behalf of Gameroon anober African country si least one Ghana lan makes a good iwing hom care rais, and many driws augment their score by rearring and sailing the animels Indeed, a care sail. weighing rate pounds--in average weight for a meture animal---can bring the equivalent of \$75

With process live that a lowcontrol care that a lowury only worth with the Characteria and the Characteria of Indebide worth of the Characteria and the Notice worth the every part of the body, Garitant notes: were the every part of the body, Garitant notes: were the nation in catalow, Garitant and in catalow, Garitant and Internet and Characteria is demethating of the South of the is demethating the south of the S

Medicine is a collection of including prescriptions that will kell the poor and isnoteed cometimes with the isnoteed cometimes with the isnote will the results of which collectively taken, ine move field than useful o maniated "

wereners so reteras



The global care rail. At drivings runs pound spectrum can retr. \$75 Arcsins bit driving part of the body—even die new to press

REE ESP

To say that these have extractinacy perception would be steaching the facts. However, recent Indings indicate that some alticatel species can communicate steany through the air of distances of up tto means

Over the past lew years several adjustes have shown that some traval and other paints defend hermschies gaintal assault by towering the number of the some the distance of the some the distance of the panet the rest adjustes of the panet the charmoal paper has of the lewes making them fail as a distance of the panet has as distance and more children for the catopolities to diget

But not long ago belog at Gaved Phoades of the Unversity of Wassington found that unattacked release 60 meters or less from thesaid ones weekel treact in the same manner picclue ing leaves and level in your frems that they would offerware contain. Obxout/s forms sent of leginal was being transmission level the allusted integer to those allusted integer

Collecting that the signal might be even undergound Riseades proceeded to did up service links to look for pressible tool conneclions. He found none its week. And that is which collegies all barmwuch Collegie begin asking hinted I which it the trues



ria all cross sty

sending chemicals through the ar

To think out Schulk patients several individually patients angler multiles and poptions under a Phasipilias charatown When he damaged the latere also began growing latere als

Behaltz says his experimetric slow that his type of communication does ske place and that it is is apper ently aromatic in nature Full the heats now under way he adds the armed at captures whether source shermal inter be carrying the message

Schulz says "Inees do some amazing trings and we are just beginning to Indi out how complex they alow animals the only thing lifey canti do is fur away --Rick Borng



Nexts secreto velociti A editorio or fine latino

REGENERATING LIMBS WITH VITAMIN A

People who lose arms or less in accident right soch be sible to grow the ona with the help of visamin A. That is the conclusion of Londorn physicae. Maj colm Master of the National Institute for Medica IPsainth, who a recently learned that offerent concertraisons of watern A make the limba of news

Normally Master asplans needs grow a new socker of arm or leg to noblace seaking the amount invest placed in weak sochbons of variant a grow aboremally long frontimbbones in a strenger variane a sockion they grow an weak (evaluate And the a sail stranger solution they specifiko exists imbis; one right behand the other

When news lose lambs Nation explains they socrete varying quantities of vitamin A. The more A. the greater the loss—and the more limb the animal inust replace Thus when a middy injured next is placed in a highly concentrated both of A it beloves these tax a whole limb or over two it reacts by reporreteriors or below.

EAR TOXINS

Researches at the St Paula Interney Macked Carter In Minispota I have fauld in the second state of the second seco

BOTULIN FOR CROSSED EYES

The town that causes behiers is one of the clean last posses known. Every so other bolish turns up in canned focat. When its partied the substance heads stagith for the new reases of the chemical acetychning, which in turn prevents the muscles from polytopic the

So when 3an hansaco ognithalinalogis Alan Social begen looking fat is way to end the munch speakers that cause crossed syss. In makasiy should not be hab the skewed liver muscles to take. Working at the SadA-Kettlewel Instal/so of Visual Social authorty on the tawn Social ingoted much amarks of budie nucle 100 pagents had of whom

had undergone unsuccessful eye surgery. The results he says were overwholm insty positive

"In most cases. Scott says." Mook several weeks and two or these rejectors to realign the eyes, but the procedure was less traumatic than surgery and espectally painless.

gaged in additional investipations to determine whether the toon could be used to treat cenebral palay and other electrics characearthind by spatiate or contracted muscles

- reck licency

A shift when it begins to speak Assess what it is that it knows -

The discovery of a new dish does more for hymen happiness than the discovery of a new star Automore Brider Second



The deadly power babon with by progenitian receiver concontracting; as a may who be while to reference and ever the





Shuh bagment iburis in she citiligaen pesaki. Divamor che nomer anoestors were bipedal ecos batos privaloping limpi 242.65

FOUR-MILLION-Y OLD MAN

In the valuence and of the closest in notifier (Bhoges where empiricular liable on inter-reported on some probably the closest interval and the state of the closest interval waked on the close is waked on the close is a charge ansate is a charge area is a ch

Last year anthiopologia

In D what of the United by of Cakhorina as Barke by obund the High bone on a survey of the negotilities made devidence that human anoestore were boost anoestore were boost anoestore were boost anoestore were boost and boost

The bright barre and skull parts Where anys may belong to the spaces Acc analoghtecus stremms belowed by earner to be one and or the human family nee. Alternowely the barres may be the first ind debth of yet another petro. Alty underfined species or when a different petros If you also see seeparable While own areas to reach any clinic son on the base of traver lyour more facility bases numeral ways and been marked with the assistance merced parts and a whole group of them the med.

With any lock the adds the Ethodium deexil will also yair, the partiel remains of two and six million ways on dynamic that denoth the missing link between 30es and men --Deve Sobe

A s. of processe he is a pulla survier that he is provembly, our processes to answerve

-Lost Star

CELLUL AR RADH

In 1989 press provided wing other the factors applied that wing other the table table and the table table table and table table table table and table table table and table table applied table tabl

I the ratio waxes where present Poli brow they would essate electric fields, depositorie outside the cells Some sprawled back and cells with banum tisnelse is powder temptive is electricity. The return there outside the set of Into accelering fields and the rights wave we're Further acpersoner's envelaet hat bouck outdoos aame from plant and annea die too field also built oogloogie too field also plant oo field also built oogloogie too field also the heating of lood rate field also also the second too field on also the control to Also percent the option of the Also of direction.

Same people believe that Pahla discovery provide a scentric explanation for EBP But Pohl issaproes These signals are includ by weak in fact, he says they are almost immedaley downed out by the saty weaks of the body and taxet from one human mind baset from one human mind

"J shink not much of yours or of mine. I hear the roll of the lights."

-Afred Lord Terrivison

LIVING BATTERIES

Sandwached berween two chemical adultana a layer of living plant cells is luming heft sets alectricity at Dhio State University such living devices may provide at alectrative to photoxitaic cells, solar collectors made of secon that credity convert sanight atto decicity.

Blochemist Ekzälpeth

Gross is searching for a wa

to harness the plant works o use of photosynthesis (converting light to usergy) as a "green each battery" Her device new pumps out 2,000 microwstats (2, minwith). Although this is not much by conventional admictated—eachout hat the output of a standard fashight battery—it is 300 that battery than her light efforts



Rhotovolusc cells. May be repleced by leving plant cells

the energy produced immediately or store it in another bettery: Our cell is a battery One possible use of Groudy solar collecto/Salitary In estillation work solentisso at Battele & Columbus Laboratores an attempting to devise artificial childrophylic protein. Sence childrotryli converte the entry of absorbed laptir riso a statile state mischor is stated as childron cal energy with a quartemiell creation of interest solentrate as a possible basis for direct photohemical production

SPACE-SURGERY SAC

As large pumbers.

people Day in living and working in Earth orbit for longer pends of time wartually someone with need consequency suggery it may be for appendices or for a pendice above And inextably the day with come where a women in ofbit will need a derivery room fast—comenting the space shuttle Columbia

Now a West German researcher has a solution H G Matke of Manich has come up with a light transparent plastic sack in which are stored all the reconstance tools for emergency surgery and child delivery in a

Various presterifized surgroat utenate are kept inside pockets in the sack Small megnets hold metal instruments down for easy retrieval

In an emergency the plastic sack would be unrolled and fixed artight TV FOR THE BLIND

Televation for the bind? Marty legally bind people may be able to departe with Boalle and reliad and write more normally through the use of closed-carcuit TV technology a California wison specified claims

specializes in treating peo-



Closed-broast two whom systems can greatly priving a printing ap that many legally blind people may be able to departing with threak

around the patient by using an elastic band at the sack sint. The mission specialities or astronauts performing the operation would inflate the sack by using a foot-powered pump and operate inside the rack by using built-in long

Once the operation is over and the body flucts are sucked out the sack can be removed, folded up, and stored for dispersel

A dream that is not interinitial is like a letter that is not read '

-Tekyud

pile with low-vision poollates notes that the average ophthalmologies, idees not know about these television systems. He continues to step has patients toward Braile and white onnes."

A hypical system includes a high-powered TV camera, a lare, a monitor and a waverg table. These dawces can be adapted for use

with typesinilars, computers and other types of business equipment

tired by Visuatek of Santa Monical California, can be used to maginfy anything from recipes to bus sched-

CONTINUUM

DOES CRIME PAY?

The pwends justice system in the United States may actually loster teon age crime by common gliads that errms pays a University of Plands errminologist warms

The inspress, netcancy and ineffectiveness of the paver is commal patter system is inself one of the causes of the between it was designed to prevent and pursh.' says Charles Thomas designed to prevent inforces designed to the university's commal patter inverses.

Thomas found that teams supposed to the system hald agraticantly less feer of punchmark abor the seperence than before Lifle f anything trappens to syvenifes caught breaking the law Thomas says. They sommit up to fibasin currises before they're caught Them as appear before the court time after time before they get even modestly supervised probation. They think, "The shift such a bacilly stills after all."

Thomas gave circled questionnaires to 2,200 pinton and tenior highachool students at the be grinning and end of the yea he found that

 Tooms in thouse usually old not have close bonds with parents or teachers. They often regarded going to parente court as 's status symbol, a formal recognition that they really were tough.

 Nears repeated as thou blemakers began to think of inerrelatives in this "new negative status" and at least a modest increase in crime lotowad

We may have hit upon one of the causes of future legal behavior. Thomas claims "Ri best, it's land of abooky"---Alien Mausin



The pace of the pa

DARK SKY CEBERVATOR

actional attributes attributes attributes attributes attributes attributes and an and attributes at

So cays Dr. Bruce Hatert is director Light polition has become such a serious problem to exist bound automotives that even the large wother holds would be an expensioning officulhelines. One setting that helines a comparing official be vestion to the merked ope when it nest returns because of light politikator over much of the United States

table of a 120-acre tract and a mountain the ASU attention of the art microcomputers and an 18 inch Cassegraman ofecope

Take to think of it are a second-correleted comluter' Ratert says The open is cutserfly used to up photoletic in photomeor decipieng binstee or study lands cocculations and to provide hands-onnetinutes to students Ratert a sociolation of surplus laterts and and a surplus laters and and and a surplus laters and a surplus laters and a surplus laters laters and a surplus laters la

"Numerous visiting as romers are encous of the lise " he notes "East of the Mississippi, you have large obles, or you have werros On satellite photos.



ADU's observatory. The definaskies cast of the Maximumor

the crity areas clarker than this are in northern Maine and the Okelenokce Swarrp —Alian Maune

The great men of science in our time are not horized by the poets. Why is this?" —Kail Shispro

HIGH-RISE SUBURI

Gity and solutio may solve toxies pothesis in a dering new concept a high-nee apartment to king of subuties houses the 15 solve sould accommodate about 50 deelings auch comptitio with yard lises and sheet A raitum garden would me thiscupt the entre building

The nevolutionary proposal springs not from whittisy but from practical consider



SITE a high rear suburb. A site i and concrete makes supporting a vertical community of etchydaekand private neucleoces.

which according to James Minas proceeding to James Nano provide the STE base Nano provide the statement has not been transmitted he explains in the statement he explains in the statement he explains the statement owned to the statement owned to the statement owned to the statement between highly in a high density metropole and in potenting substate in the statement of home state in the sta

Indeed each house would offer in alyse as apenched by tenants, croating what Wress calls a college of todoynerasies. "It would be the complete antitiess of incomprous, madernal high nea architecture." He adds: "Modern architecture and affective to the concept bockure it gost against the discin block the it discon blocker. According to Wines

constructed inside the tauking or made on the ground and then lifted into place. A Canadian devel oper is all-aidy acounting to possible locations in Florida and southern France

SOCIAL DEVOC

"Brain: An apparatus with which we shink that we shink

Hand A singular instrument worn at the end of a human smirand commonly drust into somebody's pocket."

IORN FIGHTERS

There is some truth to the rotion that people on the bink of death can survive if they possess an inherent well to live. I Indeed injured mountain climbers or petense with choose emptysense can avoid fettal heads attacks by moking a groatelian normal effort to breeffer have pacpia, according to them of locations of the inversity of Colocida in Operver are "both fightars". Dr Robert Grover who matched the research, revematch the research, revetimes tom the lang cardinal version buried deep within the reck. The sensor comwhile of a group of out in losated on the revents articles.

abled on the calobit antery Wennever courger in the Jood imps below a certain risk, the sensor cells are subvitted and energit the BillyMoot and energit the Biggroutcy muscles to work and/in Howneys, Grower asys, 'the magnitude of the mapping works termahously from your benefon to certain A sanstwo carood events is something you tert from your parents'

-Carol A Johrnann

Every cubic inch in space is a miracle CELERY ATTACK

Doctors at the Mexical College of Wascnash have elaconvent three cases of a bezare new alreagy has strikes only healthy ablatic years aucha. The three petrets were so allergs to be petrets were so allergs to the contents of physical wasemase indicidately that they would break out in have a suffer an externe oftep in blood pressive, and collester in where, shock

All of the attacks depended on the papers and gesting face when two hours of decorsing a sign allerget James Kod, who decontrier All hous palents showed positive sign test indectant to centry, wit they had no trouble if they reheard from exclass for two hours before and after eating the sector the

Once aware of their condition the patients relied on logic to treat thermalives They amply avoided mixing exercise with eaching cellery —Claria Savet



Rents new malegy Rulevin Ano combined investor exercise Richard developed hyers and collegeed in allerant shock

CONTINUUM

-Millon Foedman







BY POBERT WEIL

Al 73, Dr Landrum Shettles is still struggling to better the odds for human life PHOTOGRAFHS BY DAN McCOY When Dr. Shettles speaks, it is often with the breathless speed of someone who has been hunted.

"We are write total wate, go till you find the Amendan Bream Take ites while Cadifiac and go find the Amendan Dream it's somewhere in the Las Vegas and "

-Hunter Thompson Faar and Loalhing in Las Vegas

"Wecheaday swiner siday said the Las Vegas cabbe as we drave away in acrititing less than a white Cadillac hom the apaamodic gargle of anport skit machines. Ahead was the cheam, the neon roocoo caunos, the keno gris, the faith in the payoff on the next sall.

Such tash in gambling odds and tarthank to Dr. Lake the second second



enable conception to occur. It one chooses to perceive sex selection as a game of roulette, then Dr. Shettles has menupulated the wheel of chance through his understanding of tempe analomy ovulation, and the delicate timing of conception.

This has to be given credit to popularizing the field of sex solucion," attribution of Robert Glass, a parameter Bay Asia ante-Way respect and one of many ontos of the doctor. "Sections's books on this subject, how abuy is sum of Choose the Umaby" back, have sold hundreds of thousands of oppies over the yeas. His intentity work over four discuster, through which he has enabled socies of seering bit aren's works to choose and abiver healthy children. They provide equally coundbreaking.

I free been strendely adjusted with many of these estagecarray accomplements from the true was a boy. Divides had advanted me by Categorean acction in the warmp summer my motion would make her annual programmer line advance. More immersely and the her annual programmer line advance to immersely and the second second second second to an encode opprecision gains good by the pattern series of the Athdiment table on her toxics in bone such such resemptions and the second second second second second second second diment table on her toxics more such such resemptions where the second second second second second second second the wes about to solo as a sociation is used. Table ware

Many years later in early 1982 as an editor at Oron 1 learned that Dr Shettles had set up a practice at the Star Clinic an enwork was the realization of the in into theories propriated by Actous Husley in Brave New World S0 years ago. His supporters and he hand anticipated, years before, much of the fertility work that has come in the lass. 1970s.

But there existed concomtantly a dark side to this most humble of main a trapp undercarrient that has never entered into the Who's Who isting When he species it is often with the breathless special of semicine who has been humble. There is basis for this

Attimete particle decadas of practice at the end of network Control Pressponden Morcal Centre States suffect on a At that the Inclose sense (a) Settings to a sense of the answer (b) Settings of the States to same then pedaseseral galing mooprism. Devide sensembers about the provide in the equation sectors and the setting of the states of the setting of the set

"God damn 6 11 give you five minutes to get out of here, or 11 have the detectives come in and arrest you and take you out," Starffee smarthe was told at the and in 1973 to the beloan-born

premerrant socially can introlling and larging portions that had upt options a two mites northing to control a two mites northing the social social social social social had unbosen to pursue the weath in two hypoth controversial autos. One was close a specificativy severical argum of personal social social social and the social social social social dispersion of the social social social social social social social social transfer processing by which is a two- to thread-size of any the ultrast of one warrant to a particular social social social autorest and social social social activity provide the social social

Descript Sections numercoal accomplements, I was to discover that his controlliant to the ted of medicase Units to the ted of medicase On the one hand, he was a member of the Royal Society of Medicane in London, besides telding published hyrides of loaddenic papers on lentilyland subjects, and ho ssearch was the basis for secric lians in the basis for secric lians in admirer, his subjects of admirer, based on the onsearch was because in Link, They subject on the basis for secret lians admirer, his subjects of the dates for secret lians admirer, his subjects. Vande Weis. Shatties recalls matter oftochy, And I pooled my things up anciets free chrsc. Lake the doctor was nate we ness in the Del Zie trail in 1978 in which a New York roupin, John and Deris Del Zie, accessifiely and Columita, Pretryment for destroying the path data solution that hwh this head weald become their back

To the day virtually a Lid decade when Sections a target operative both the heat paid. The allies remarks intracelle a cloud thread of the section of the section of the Modula Clottle particular approximative Modula Clottle particular approximative modulation of the section of the section Modulation of the section of the section Modulation of the section of the Doring Decider Decider of the section of the section of the Decider Decider of the section of the section of the Decider Decider of the section of the section of the Decider Decider of the section of the section of the Decider Decider Decider of the section of the section of the Decider Decider Decider of the section of the section of the Decider Decider Decider Decider of the section of the section of the Decider Decider Decider Decider of the section of the section of the Decider Decid

Life other scientists on the most autraine images of newarch. Shettise has engondered both enry and increduity this unorthodox scientific methods which seem generally to rely more all instation then on rigorously controlled data, have been obligened by charges of scientists.

Shellika in always gung the listennel stuff, which anges the scenific community invest ancherio Dr. Renald Encoon. A repoduche physiological whole own work has been published several timos in the privilegoes Ethen scence gunna Me and the privilegoes Ethen scence of day and the privilegoes and the scence and the to start scence of the scence of the Resource and the scence and the Resource and the scence and the

Also an authority on site selection. Dr. Encision mainteins in an interview that most of Bhittlasis porearing theories are indeed with meaourables. The public is much more significant than it was a decade ago. They or not going to put up with that cmp (Shettlesis sex-selection theories). Whith you go to playing with public plas emptions. Encision continues. If just dealert with

Shettler on the other hand charges that Encode protect of this theorem, Such wis the case, Shettler says, with his discovery of the separate x and y spare in the wary 1962e-at Indrig Shettler insets was published in altered form by Encetron in Antere in 1973.

Encision heatedy denses the change that he used parts of Shottless findings. I was familiar with his work. There wasn't anyhing to quote (ward to be as far away from Shottless work as I can ' he says

Following his departure from Columbus Shetties served is successful stint as chief objections at Offerd Memorial Hopping in Randolph Vermant, where he delawared babies to the local people (see "The Clone 94 DWA Decks: Match 1979) But the also began to bepinnishif with the signal of a live of his potentia, a practice that decked a lack of other time to the hospital's authorities. The confines of the hospital's authorities. The confines of that hand hisse linguind village hardly proved to be auspiceus for such corrowing listelity work: "No lateve to be carbid in that vety you's setting." The clotur recals in the decked

Thesis in Weimorf Teasweich tear Bettein received a proving invitation A Europlain couple with an shafting strength meather than the strength strength meather than the strength strength strength strength the strength stren

The clinic was surrounded by the Lotus Inn Motor Hotel, with a small casino, the Little White Chapel, which promised instant weddings, and Chato's Best Mexican Food nght next gbor?

Under the microscopes, then long talk furoughly liathing, spermithicory were burrowing hashlist into eggs, and sistikaud shu eggs were expanding, chieding, or if bolanorshlad, building, and brasking up retowhole populations of separate emeryor.

Sutting out to find the generologistis new clinic. I drove past some of the mapsic heliek that front Las Vegas's famous prosorable—the Topicana, the Riemango the Standust and finally the Sahara.

The Stat Cellic stood out in distinct contrast farther north along Las Vegas Boulewird South. The building itself: converted to a medical facility from a Veroides. car body shop was in an area plaqued at right hybrazer street problation. The office was surrounded by the Lotus I'm Moter Hotel, which boasted a small casino the Liffe White Chapel which promeet inplant weddings, and Charts a Beat Mixecian Flood Perklaward noth revis door

We in the midst of this most commercellard setting was alertify lactory applice that gave the cestments and envects, odr-...Rientacization treasures, read the clinic sign that flapped crockedly in the dry development.

Dr Shettlis was already wating purside for me He was a short, slightly slockyman rish har was whith thai i livel yeen in potures, but his round face ratained those distinct pails that made him look just a bit like Truman Capita

He was far more spry and active than I had imagined and he segmed thrilled with a visitor from the East

You took just like your moher: here maked adding that he hadro law on maked adding that he hadro law of the dense strong here any source law of the dense South I presented here well source of the dense South I presented here well and too Japanese grines permittige that my guard taken had becaute here. To years before No. In a could's possibly accepted herm, her here well here and here all presents that here adding the mathematic taken and the source of the sou

It is defined to environ a true "baby lactory which recalling Base New World in Harvey tabueto society docile workors material based on the society of the societies mosteler these own and finally decald aftering with an efforties processes Harvey in the classic published in 1932, warms that such a world runs the risk of becoming batterial man and gobles.

His weitings are not ignored by the doctor from Particles Messespin who was laboring here to create this our hally factory and research tab. At several juncaries in the conversional matthes mayded the rame of God internating that he was but his harmble servant.

The part of the means. Startist believes that he part restless one warren avoid had by partenetisments to have additioners warm. For exemptive work believes additional to the means work to the approximation of the means work to the approximation of the means and the additional the additional to the second built for additional to the additional to the winding mether. Shelfers means of the plane the additional to the second built for the second built additional to the second built additional to the second built for the second built additional to the second built additional to the second built for the second built additional to the second built additional to the second built for the second built additional to the second built additional the second built additional to the second built to the second built additional to the second built addi

What distinguishes. Shelfies from the other

madical respectivities involved in Twel-back server and the three principal server in the Deletionmetry of Patrics' Strepton and Dr. Robert Missiones, the Carlina Homin that deletion that the Carling and the Carling and the server of the Carling and the Carling and the Strepton Strepton and Strepton and Strepton Carling and these of the Strepton Strepton Brefford provide and Strepton and Strepton and Carling and Street on Homine Strepton and Carling and Street on Homine Strepton Brefford provide and Strepton and Strepton Brefford And Strepton Br

In voto is a Later presse that mains in galaxis. There are only a fore steps in the mivion behication procedure. A physician removes or seprates a mature agg from a woman sociary with a symple or reedo The nose egg, still bahmig in a pool of the vortex's followable that a galaxie of a period dum a cubate or a period bit where the name on surveit

A constant flow of oxygen carbon dearide and introgen osculates through the data to keep the unintrilized egg alive while it weaks as is indexively with the sperm

A male donor often provideneously, provides a specmen. The epoculatory scoretion is than spun in a centrifuge lube and washed so that the sparm calls will be sepasied from the seminal fluid. The sorted spermazza are then introduced to the egg friguigh is coated polyethylene tube or a twocdamic needle

The motive is allowed to st and incubate at body semperature to semulate the in www.conception.conditions of the motior's folloosen subes

If all goes according to plan—If one heatly sperm cell is able to persente the nucleus of the egg—Iestization will take splace. Approximately 30 hours later the motule will obcare or divide into two cells. Alter some 30 to 50 hours the physician will itemova the boding eight-cell entrys to tenthe det and implant on the women's vietual with a series.

The process sounds relatively routine But in spite of the birth of several docan indi-Jube backets since 1975. The success rate for an who conceptions thil remains very low. For scample the Norfolk Virgens seam attempted 46 might show before traily trumpting with the tath of literature (ser in December 1981.

Shother suggested a new method their imply enhances the oxids can be that he beleven has not been attempted before innature a human opg is covered by a microecopecity emillioned risket income bail open, in the same way that the white part of a here sigg protects the yellow muchus. Settless before an in who tertilization is settempted in that way the sperim would before an in who tertilization is not have to break down the well that proleads the untertilized nucleus." " wort to take the egg and emove the zone and price the sparm right free to it (the egg), like the bady to the nurreng break. Opening up the zone withically gives the sparm is direct on an the egg. Shettles explained.

This defines to the low success state, other problems assimative with the lessificate experiments, Way, for example in there this overversing majority of individue bothes been located in Again Strettles supported at mitake the supported of the second state second second state of the second state of the second second second state of the second s

The book of a diversity of the struct the polymer. The polymer, the polymer, the polymer, the polymer, the polymer, the polymer is by polymer that the subject structure is the used on the subject structure is the carty HMSIs He planned to if it her making the work of the planned to if it her making the work of the planned to be present the specific and the planned to the planned

Everything becomes so hermonicus





These is the active of a revel substratery of Control Liverstratery was a series of the substratery of Control Liverstratery was a series of the substratery of an a polargian stratery. They have built a device an user of the series was a series of the lice (charging stratery in the series of the lice (charging stratery in the series of the control integer processing of the line of the control integer processing of the line of the series of the series of the control integer processing of the line of the series of the series of the control integer processing of the line of the series of the series of the line of the series of the series of the line of the series of the series of the line of the series of the series of the line of the series of the series of the line of the series of the series of the line of the series of the series of the line of the series of the series of the line of the series of the series of the line of the series of the series of the line of the series of the series of the series of the line of the series of the series of the series of the line of the series of the series of the series of the line of the series of the series of the series of the line of the series of the series of the series of the line of the series of the series of the series of the line of the series of the series of the series of the line of the series of the series of the series of the line of the series of the series of the series of the series of the line of the series of the line of the series of the series of the series of the series of the line of the series of the line of the series o

BY RICHARD WOLKOMIR

On the contrary At the National Research and Resource Facility for Submicron Shuchares, in upshile New York scientasts are looking into the technological Natire And they say that in the decades

Microtools for microwork. The massive sen im plantation system (right) is used to anthence the afficiency of the circuitry on a select water, resociections can mention their translescet through 44 ion of the microty window (above).

> PHOTOGRAPHS BY DAN MCCOY





GWe are already fabrication chips at the bottom edge of reality To go smaller researchers have to delve below the edge

ment with electronic devices an overware a human hair. Such grouts will produce making today's best look like electronic brontosauruses And other research at the

Funds for the laboratory and its persondiation, Cornell University, a number of corbuild devices and integrated circuits that

smaller, the researchers have to delve be-

Cutwardly the interatory resembles a the root are symbols meaning "less than a ter about one excleth the derrular of a human heir And it is because of the timness of this work that structures within the micron knel where matter is only a lew ecorrs that a dropped sonwdriver can The laboratory is a zoo for lance and esofic mechanes. Some til a room with pole

wrea and paper amoking with supercold ere of meter on a crystal, each laver one at a specific point within a crystal, pre- integrated prouts over trate? pastly altering the crystal's diocho procfrons to draw intricate prouts on a secon

woes. They carve patients on more molbiniang to real like a report god.

fow atoms thick. Money focusing an elecstroy them-Heisenberg's Uncertainty world a dust particle can be as deveatat-

searchers at keyboards triker with woleo

Ar pressure reside the 'sporatory is higher than outside. When the door opens, the laboratory always exhales, never mhalong the world a teth Before entering. visitors must poke their shoes into a cleansmocks and bornets in a ritual rommatemples holy of holes. The laboratory is a particles of dust one halt mitron in diam 300,000 Around many of the more faeld The machines in their own chanelline

rooms are surrounded by smooked at-



Small means potent A computer to hought am more distribution autothop come to the point much larger if they need used only ability common method and in mintreesenary's thread when liked a norm work is in its register's poder of the integraphy tokes is standard technology for a printing condition electronicipe, has advanced in a discussification of the advanced in a discussification of altered there is followed technology at the followed the followed at the standard technology at the followed the followed at the followed the discussion descendences at the technology technology at the discussion of the discussion o

Light is the inclinease instantin Theorem biolography memory accreation a allocan addler. In mark the some way that light is a dark-commission shorts the negatives in age on photographics benegatives in age on photographics age of a source color materials and and an allow of all the source color materials—enables empirical active color materials—enables empirical active color materials—enables empirical active color materials—enables empirical active color actives and the of all the of all the source data and an all the of all the of all the order color on the off-the all the period color on the off-the all the all the all the all the color on the off-the all the all the all the all the source assource and and the source based and an end on the source Based and an end on the source all the all the source assource and the source assource assource and the source assource assource and the source assource asso

Such chips now contain details down to about two microris. One micron details are possible. But below that level nature has errorbed a sign that reads water out!

Eight-with a wavelength of about half a micron—is samply foo big and outrag to write: submicron Insis II is like attempting for permansion using a baseball bat digped in rick floomputer dipate to bitrik all further we need new imprinting technologies. And that is the National Submicron Facility is called

But a surry thing happened on route to this ministure Cz. Science and technology singled. Are the laboratory's physicies chosais and ong neers deagring the tet generation of electronic quils? Or are hely polong the scotes of the universe?

"We think we understand that built picoerates of mattine and the nature of a single atom says the Submetron Pacifity of the Cre Edward D. Wolf. What we don't understand is the behavior of very small photologies of matter where these are too tere atoms to have built properties and too many atoms to exhibit atoms character rules. That is the redem invicts we work.

Well is an expensional traveler in the costs Body in SPO curreng a wint at the Hughes Research Laboratomes in Califorgen tething menotres politikes of angular other hand of a starget prior Each policin ange web about six monorer high. Ner about the hand of a starget prior Each policin ange web about six monorer high. Ner about 100,000 of them on the host. The however high foot was maximum due to whole howeverly floot was maximum due to the

With modern technology. Woll muses we could get about s billion angels on the course over Gestmällercogn to relation and mettroommisk-unit 0 Michael latacom ismeeting physics, discovered the late of the ump a Submission Electron. We ump a Submission Electron to conscione known that STEM – which shows out a beam of electrons in which shows out a beam of electrons in which shows and a beam of electrons in which shows and a beam of electrons in which the shows are shown and shows the shows and the shows and shows the shows and the shows and shows the shows and the shows and shows the shows all beam of the shows and shows the shows and sh

The work could contribute to a new generation of micrachips that would process data with mere scintiliss of light sparkling through a tmy network of fibers.

ragie uses STEM electrofis de avritig interument lasacisma alexady has used the elibeam lo produce history s smellest arritects. He has etched on a sat crystal lesta trat ase unit 15 inamenterisma wolé jone nanometer is a thousandh ol s morari or a bilitanth ol a impáni

Using the elboarn isaaccon recently drilled two twies yas 30 engineerins apart in a crystal (one angetram equais about two hydrogrin atomo). The two tound holes drilled in preisumably acid crystal began an flow heremone shareless.

The separate openings diffed together Soon there was only one round hole an Alice in Wanderland phenomenon that it will being studied

The universe issuescon is exploring from 1 other to 20 others in size, is a litipation singular with inscinate powers. It is this sealin that governs catalysts. DNA poterns, enzymers the Sales will all the As laaaccous deved further ratio his printed universe he will almost oversally deacower new phenomena—catalystic on Mats ings amont alwore.

But even e-beams the field wave it automotion construction work, may some-

times be insufficiently precise to probatrees lascinating alian works. Electrons elimited as they are, have some prouver limited as they are, have some prouver limited as they are when they interact with some autiaces.

Elecent Wography is similar to priori torgaphy except that if updates a improvement of the interpretation of the wever. Computer controlled mapping this same the barr as the detection andle they large on a same. Such a device same same was used by the beam to eith orthological entry to used the beam to eith orthological torget the similar observations of the Simpletone was used to be beam to eith orthological logical effects so small has help could be assess the simple observation of an indvicual same. The data same here in the induced of extransion of the simple of the induced of extransion.

But when the obsents interctions strive a straget they have as motion energy that they disindge some of the target a electors. As one of the laboratory aphysicallipatist "They labbe about 0 That meansdepending on the thickness of the sutaco-thete-beam interaive acconstitution" matingly lazzy at line woths significantly below 0 it rearon.

To go smaller all the anover may be one Aeron who's remotion with boomstry or too lee poteng electrons as that it is electronicy content of the term of the see them an electron. But for the very reations it will applied back least on import And as bomican Facility reservoires are now returning an increases through the machine which can "write" lines down to 2011 micron wide. They also are expermenting with yet emphase through the set applied to the set of the term and yet and them using X stays.

The kind of lectrology tes opend paths leading down blook the inition. And tion everywhere solentizes are coming for a peek. Some want to see the exact, faurts Some want to use any schrology to baild machines with toboling regions cayobilbe. Othere want to try achienty.

 Aritis Fault fixed to discrete so- present of Aritismic Source sort fixed and the aritismic Source sort fixed and the aritismic Source sort fixed analysis and the aritismic Source sort fixed analysis and the aritismic Source source of and a source source source of and a source source source of and the aritismic the source source of and the aritismic the source of the aritismic and the aritismic the source of the and the aritismic the and the aritismic Joseph Bellergine, dreubs of Loans Information Schule Representations ingentivers with motocoles Representations ingentivers with motocoles Representations ingentions and an exploration latent, and schule and an exploration latent, and schule and an exploration latent, and Several trougeroses (coltron of lagif cault) find dreum finance filters, and the schule schule and an exploration latent and schule and and an exploration latent and schule and an exploration latent and schule and an exploration latent and an exploration latent an exploration latent an exploration

 Activate Central Inservatives Invitational Neurophysic Kinn, in elabertical inservatirestructional Kinn, and an elabertical inservatives of the service services of the service of the service of the services of the service of the service of the services of the service of the service of the service services of the service of the service of the service services of the service of the service of the service of the services of the service of the service of the service of the services of the service of the service of the service of the services of the service of the service of the service of the services of the service of the service of the service of the services of the service of the service of the service of the service of the services of the service of the service of the service of the service of the services of the service of the servic

Robert Buhrman, associate director o

The Submerson Faulty and associate protises of displiced engineering physics, is developing, Josephero particles, nellpaetonducing Calification Interference Devoise, or SSULDA These entry sensitive individents and oblice (pgglos in the asthosemente), including the same transmission of the social the university in the family sensitive social the university in the family displayed social the university in the family displayed begrets where the scambit or benervisor has they have been done and detect hear and brain atomeniate

Meenvinie the Josepherr unchn used in SQL De right also social un computes Researches predict that by 1999 we will assis compute the size of abseeball that is at least seven three Select than today is best if would chriveatout as much power as a 60 wat in the bub

ComeVs processor of electrical engineering laster (Electrical Insultant Insultant a sitem developing Molecular Beam Episas) in a board of ethicing a way portions of the conclusing juve of sites of the conclusion player of a set of the conclusion player and the each layer pad on the sitem fract. Instead of with allocon flay work with gallum asset, the site fraction fraction that work which have promining properties producing works at to free free table than site fraction. They work is supported by the Perragon work of the perspective period.

sees computers too fast for a potential enomy to tap into

From access the country index chers are mailing pligrimages to the Buthmicron Feutry, using the labs unique equipment for an emity of projects. After so many yoars of believing bigger is belier. Artencers may yoon find it were easily to think simal

"Currently this is a hot research field says Thomas E. Everhart. Control's clean of engineering." Industry needs this knowledge, and the nation needs it."

He points cut that in the cast 20 years the sometoenductor industry has siturus in oncubs from 25 metors down to 25 mecores (barring the rest 20 years, has scartain, we will be manufacturing in the 0.25micror flactify, bendead dowleaping much of the new technology, is training a new generation of eigeneers to werk with tomore a constit with small.

Industry also is ectore in submeron the seeth with paperase under way of ISM Bell Laborationes. Twas instruments, hughes Research Laboratores and cher companies. But Eventine's sign that indutial researchem locured on products are other loop preseived to See on basis in activity of the second second second second camera and the second second second second camera and the second second second second camera and the second camera and second second

Perhaps the most puzzing quastion in



submicron research, however, is whether the science of this technology is more fundemental, is a manufactured structure just a few atoms wide morely another machine? On is it actually an experiment in basis science?

Dur transistors are going to operate all unmagnably tagt hequinosis. Not only as as maiorities them small but we re-using completely new physics isays Joe Barnett, a South African engineer who cather to the Submicron Facely as a graduate dudent from filteran to work-on gallum tosenses semeconductors. The physicistic are tolinanto with the same

As they build devices in the submitteen main, angings to floppenty in differselves note, to nose with discontients an electron is—4 you want to stay cober phrases tays, the adds. Two in Wessen phrases/phy, we in not in good shape to simphrases/phy, we in not in good shape to simphrases/phy, we in not in good shape to simphrases, because they in both waves and phrates, because they in both waves and phrates at the same time.

 Is his own work science or technology? We're working in the crack between We on encodering charges, be says

In his office at the Submicron Facility after a workday that begins at 6.30 A.M. Wold sometimes fools around with a circa-1910 stereosceps viewer. He uses the antique to give visitors a 3-D peep into the submicron scree One of the messagapic insight is insight when na was an accordent of Hugher Piesatach, Laborationes shows a laiser beam uitatar of a micromotor paring aganta i poportraf is hull. The orither measures 32 materia actuale. But when it to work of poportraf is hull. The orither measures 12 materia actuale. But when it to work of post and a micromotor parameters are an actual to the work are brown in the actual table the policy of the set of the actual table sponger and the set from the material facts graphing toth. One there are show enforce mediate rays. Has a

You could be vewing another planet Perhaps a marine planet, where kelp bocknis sincostly in a chemical see where the tatura si nocempetentiata it is all'hast for Well to explain his submicro. noce. We know noting instand not even in our own see range it a all'fibered through our own see range it a silfibered through our own see range.

He figs another shide into his Mirroscope This one atminis the view further to or a ungetion field electron-win thing fiamerin? You also tragging along atministers bundled togother, like bay grappis. Here are two back matters futures further or the back matters future motibal is a stray etcm of one am

Actually you can't see at this level, be cause everything is smaller than the wavelength of light. Well explains Again he percention this starsestoope, pondering "Nike leateson has been along indrectly with the leatening transmission eleo ten microscope you have the detector says. They dip fuzzer than the because other energies of the leatening. There would be a elifuse cloud of electrons around the models."

To many people the world on which Wolf trans his machines is inscrutable. Groes a between reporter blanked but to Wolf who had played collegistic basketbal. But youre such a big guy to be working on such lifte thriftight.

Wolf responds to this " it is hard for people to conceive of smallness. If is taken to conceive of shellar distances."

Conceive of this Wolf suggests The total exprises of the universities a estimated to be SUblian light-years. And Earth is a more speck in that expanse. New suppose someone were to meent a great magnitying machine that could increase the size of anything, without limit.

And suppose that you magnified Earth to the size of the whole universe. This init mense magnification—Earth to universe —would be less of a job for our integrany machine than magnifying a single hydrocen agon to the size of Earth. Whit save

Of course no one has yet built the gravit magnifying machine. Builthe laboratory may have done something more important, to bring email systems of atoms within the single of human perception. DO



FICTION

The sports of war revoal an ironic truth about wotor and vanouished and indomitable spirit



Thank God, the runway was of Changes waiting for us So apparently louched down sail bomb went off overhead. But steer his plane off the con-

pushover As well it mediad mition displaced Americana packed into our plane-with a second ilyushin to follow barovsk-ending up outside

was no reception committee as good a place as any other

clear An Aarchot crew had those Canadian bastards highl been king after all The Chinese hadn't fooded over the frontier to Milup this spur the priot's nervous system of the Soviet Lines. And yet lasted long enough for him to somehow we hadn't believed onete onto grass-unless ho as if the spirit that impelled us lowerd the East had Anyway our landing was a promised an this land and had preserved if for up

arport, the rest of us counded got them going and drove in CETINGN 1182 DOWITIONT ROLE the Far East Hotel on Karl Most worelarful of all, there Mark Street which geerred





There weren't too many sheveled mumwere reasonably clean and neat. The huburrow if it could get there in time

114 out told Hark Sullwars to take a fabaue sound round the hotel to clear all the Many cried out," Greg, come over here

She was eazying the handset of an old-

I hadn't been meaning to bring Mary in washi't a safer or mechanic of tecomotive drame Rut she was a line survivor and h dating up fah and chipmunk stew or netthe-and mushroom soup without a single not or stown with a technical accomplish-

So when she'd insisted, we'd comproup in Magadan for later delivery and Mary came along as our provisions officer. She was still looking fairly gaunt-as were use a mousy brown. But I leved her even more dearly after all that we'd been through

What is #7

I can to her while everyone turned to which us, and if was then-when I get my hands on that phone and heard it hummino-that it really all came home to me.

Benauta the contriamo lovely did phone hypoelectric scheme that was still churning out electricity automatically

the lobby " get your ass behind that charde

entheated Nev stanced over the 45dusty suts and dresses, careful not to spil the carments with his boots

Beeing Strat, weld all got nd of our bark first Soviet outpost. The other scrapgy our this summer after the War, would have to wat just a little longer for proper clothes

The phone box had a slot for two-ko peck proces, buill guessed that you didn't need money for a cal inside the hotelalmost as if the phone was talling me how Billy howled out a number and I dialed

Hullo? Can you hear me. Bifly? I sad "Sure fring

And I saluted the phone. This was a real I was phoning home to the States. Only of

"General Greg Berry reporting Wave inacted Khabarbok Were of the puto of the Trans-Shorten Ralesty Group Red will set up an air shuttle service to Mace dan tomorrow Group White will take a town Chooms there either-and so halo me I know no deep down in me there won't be set-then Group White'l sai the bidgest wanter they can handle out of the navy

every word of it was true. As Nery watched,

It was a damned shame about last year to

As the culmination of the U.S. govern

One single SRB detonated over Moscow would kill every living thing in the city And it would leave churches, factories, and apartment blocks in perfect condition 9

weapone which wouldn't wipe out the of the Eightes as the neutron bomb wat

The SRR work own hardly any blast pr heat diamage if an-burst correctly, none at all flut its abort-term radiation vield was menocible-and without any residual radeadwity One single SRB databased over the factories and apartment blocks, all the offices and shops, all the museums and

The Soviets of course, denounced this sons And they in turn unveiled their own

The Devi tempel must have had a hand

How exactly it did is 1 don't know for sure

and we never had time fully to sugg out the level, their affected any manimate matter worked, or tailored by man leaving a partouine "suprature" written in it. The SOB had no effect at all on living teaus or landscape or minerals in the ground, or svon tooristuffs-though it put paid to the conmade or shaped article within its held they sloped out of excitorical perhaps reor in some paralel universe. Within minutes a thing grew soft then foody them

in other words, drop an SQB on New York City and very soon you would have no New York City at all only an empity space

when things grew toggy The Soviets had utes to get clear, but how could that he'p the prew and passengets on an ariner? They would rain down from the stratoschote. Or the office staft on the fifteen foor of a skyscraper? They would find themselves with no floors beneath their band

These could amount to millions

grining. How many more would did in the following weeks of cold or hunder---as food

And they had the call to call it a "hupartnos in the creat collectoria al the highways and gas stations all the space hospital every surficeed of refinery and shopping mail every pan of Budwelser and Solden Gate Bridge Dianeyland the lot

In less than an hour the USA and the USER exchanged their entire assenals of

But we write left calved without a griglo possisation except what we could make

And nobody pame to help us. God. forw they must have hated us, for years! The and of the world shunned us. They treated must on our bare shores. No amplanet landed on our fields. The Mexcans spurned us Thear The Canadians lenged off their bodies and built a web electrified comder running all the way up through British Columba into Alekin, live a couble Berth Wall They tidd us to get lost

But God has got to have been on our side Something, some dwine force clearly put it into all of our heads just what we had to do, and how

You take a nation without a permy to its name. You take that and you take a word country that a been completely cleaned out of people, tuil of empty cities and tectories aligorits and harbours.

You put the two things together, and what do you get?

You get a whole population marching in the only direction possible—to recover the boods they need to carry on

You get a shreeing staiwing rather densed in dopkins and such haung logs noth to build with and ulgarius to cross the lang Stratt and fing back some rold shores from the other sode—while the list porcess press on such its back of lagt para or four-weak drive to get to some where taid-docert and finus or and supply the route for all-hous who would show they route for all-hous who would show

And as with animal imgrations, there is an instructive almost guided aspect to 6as if our destination has been broadcasting to us. As well as broadcasting to everyone elas. To leave it bell So like supersttous peasants, is seems the Chinese have kept aud of the LBSH Validonatics is even closer to Christ then Rhadbowski is builtor save leve would find Validonatick empty too lamit that is couldn't be on handhed bencest patielies of this Sit we amwed in Rhabowski. But now—mail is aid auther in the hopped in my heart. This short leve treewed for us, the victors, from one shiring poan the Patiets, to the shorts Setti Set

Later since it was a golden evening and weld all done as much as we reasonably rould I decread four hours R and R

Billy Hank and I removed a botte of Solichneya vodek from the hotel kitcher and wardeletel out is hit the toen. Mary doctared she was exhausted and could do with an entry right, but I benk she pad said so to give us boys a chance to get roaring durik.

Some cogenation plann Average Jammi Spatra admining the silicat things say pedal cars on a lene around the weeky flowerbode, bilandowid on-calemon caths, rows of bright red thut direk machines with the stropp goal at direk on them and of course a stable of that man with his societ's odd not planning toward in the futures and backing approximation by the his methy buildings uncode has not his methy buildings uncode has not

We took in another public park behind the Dynamo Football Stadium, but the moleculors chow as out of them. So we



went window-shopping instead---which may seem allife weid for three grown men expecially as the goods in the shop windows were lew and poor stift. But my God, actual stop windows---with Wings in them!

Crear of the shops was a grocer's A gas tostom. We were getting pretty good at packing out names of streets and buildings in the prazy Russen characters.

"I ve never lasted caviar," said Billy

"Solar and some cars of covar" I said in we work A murry which we took to be a shopping to be provided by the optic bane up at approximately the optic shell. Other mumaes in suits and rogay costs and unitaria, lay pilot up against the lauor courter and behind is now provided that area. Heak recoped up helf a doorn the cars, which we all then were

Thank you Miss. Billy giggled nervously so handed him the vocks totle to kell it. As he probled it he troouged

We took the cars off to a retautant, when there weren't many octacias, and switched on the lighting, which worked, as the phone had worked, though the result was desconsingly bright. The Russians' must have liked to chat to one another with searchights bering on their kors. We all lightly contarry lang the cars and a hand sottwee mercy, written in pendi

Service is size allow. Hark pixed Producing a hook of a can opener from his Soviet unform he lossed has no fine tablecieft for us "I'm going to find something to wash these down. He headed for the lacther.

Billy picked up the menu while I was working on the caris. His eyes blinked like an owite

"Besich" he pronounced in a puzzled voice as if that menu acritobed by in durviewspeaker was being hin what it and "Salat eez Krati. We'd better get good at this in Carego" II wersi going to be living in Rassia for the rest of our lives."

"You know old buddy you're right" nodded "We aren't going to be able to after all the signs and notices....

"And degrams and late and warrings and instructions-

"And et cetere We aren't going to be sble to charge them all over into English very quickly ill ever

Heak returned, sourchardy challing another bottle with and skysteraper or the label Vory lives a poture of some Nexteen failure building in New York screet failure slightlenger was probably some state oftice block in Moscow and Moscow shi lessing.

We casually exhibit the weight have been grange the street. So we peed conside A vectory parade was heading our side A vectory parade was heading our and jamost dawe Wentock at the wheel of the lauding very list. The regression of the and jamost dawe Wentock at the vector was heading basic leaved the Fuel Face head appear retrouctions, and the had had head be appear retrouctions, and the had had head be appear retrouctions, and head had had be to the lances.
pie of private automobiles too 1 guess their receivers hedrit cracked during the prethey were being driven only a little way we were going to own Volgas and Zhigula. the way we had cerned Chevros and Mus-

he parade was as neary as a Fourth of July celebration

the clead, etc?

This made me frown I was feeling just a little mead in now on account of the date in what I felt sure was a very Russian way

I took the bottle from Hank and waved it

Here's a tosst you puss! To prosperity

To rairoads and liquor " Billy shouted

I don't know that my friend Billy know words like contruccore. It sounded like a Russian word the way he said d

I count hold of Billy by the lapels and groped him tofit. The streetights had come on automatically awhile back and Billy's

We beat the Commiss. Belly The Com-

one another. I think Major Billy Donaldson

Next moming we all assembled outside the batel. Our numbers had been saciles on the second livushin. (The livushin we d back north to Magadan) The pilot of the second Wushin a Captain Tom Quinn Ihad come into town to see the place and get he should have slaved at the airport but

red planet itself! You know "he confided. "I was a bit nervous, picting that Comme orate But it was just as if that ole plane New harself Coppol "He was wearing some dead Soviet pilot's uniform with the Order

That's very rice. Captain. Now please get the hell back to the arport, would you?

Today was raineed day. The Trace St benanicalled us. So we all piled into trucks and buses and headed off up Katl Mats Street Ioward Khabarovskis trein station

"When the Saints Come Marching In," and everyone kined in Then, as our convey song charged saelt into 'Maryland, My

Maryland " Everyone seemed to have forcolten the words and sust carried on hum-

I keeped my fricers

people's tag is deepestred?" I heard a angle your ang out amost the hart-

melting down all the statutes of that man into something useful such as coins and jingling in my pockst again, even though "His Hark I called What do you sup-

"But what about dollars and cents, for

6Bity fingered everything rapturously Well, so did l Hore was everything that -we'd been dreaming about in a crazed way All here, sust waiting for us to use?

Chott's take? Why not use our money? from? Have you got any Treasury plates to

There'll shift be billions of dollars abroad

Electronic money a lot of r. Answay of here -he chuckled- somebody seems

Maybe there's been a United Nations resolution—"o quarientine the USSP? B/h suggested

Just ika everyone quarattered Amer-

Hank leaned close to Billy

"Nobody can breather the air here but money "So I figure we'll use this stuff as soon as we get proanzed. We get call the

The easier to call them roubles and kopecks "Bily observed "Alter all that a fuse the growing kids '

climbed aboard one of the preen passen ger pare of the Voitok, afting on the aguitbeen in tracket at the time the rischelion through the steppes and forests. But here

a ventible mobile palace of the tracks. Sold brass fittings everywhere Mahopany foors. Golden curtains hanging at the win dows Red plush seats-even the swing

Holy Mosesi It's i ke some giant Cunard iner from the Ninetsen-twortios or Thir

Billy Ingered everything rapturously Weil so did | Here was everything that we'r months. All here, just waiting for us to use

"Of course, "I had to remind Billy cently "the whole USSR isn't all like the

Well hell but even so? I mean things

Finally Billy tore terrself away from the Czech diesel loco

Group Write with Billy in command ple of hours-later the CHS4 that pulled the going to say with a skeleton crew But i atteady had that of course Once out o stop and pwitch any points themselves.

The machinery practically totol us what we

That was all four herosc months apo

of the world and what we've accom-Sibenan Ralway taot-or the construction of the prest hydroelectric scheme at

We ve ferried lifty million-plus survivors down to Viadivortick in the superb Sover carely No doubt there il be another amaile

We we settled them in Wardworks itself and here in Khabatovsk, and down river at Komportolsk and along the rairoad ine kutsk near the shore of Lake Baika), and

hard, each according to his or her capaci-

ATARI INTRODUCES

A video game series so challenging, you could win up to \$150,000 in prizes for solving it.

Atten's new SwordQuest takes separate valoo game cartridgesin search of a presidel sword. The Sword of Ulternate Scenery

But along the way, you could so ultimate treasure a \$50,000 ereSaveriGuest challenge (see game

To help you solve each game, cartridge ft contains the detailed atory of that SwordQuest game of Neurd Questis four recursie

SWORDQUEST

an expert player And you'll be

1963). fill in the appropriate cluss and you'll receive an official Atan BarthWorld, the first SwoodQuest

carindge, as here now FireWorld" as coming soon Water World" and Air-World " will be out by Fall, 1963 So start solving new Aber The approxy was start the approxy you'll got to the bottom of th STARY ATARE ATARE ATARE No. of the



by But wrive all out on we off---or lat, at any rists And we've put on a different style of clothing too now that the Sibenan wintor's here at lest. We stude or weddite about. bundled in long thick coats with fur hers on our heads, and earmuffs

We we managed to result ish a money darned kopecks and roubles

We drink vorka and sweet champeone since that's what the distilenes turn but We eat black bread and pickled sturgeon and red cabbage and such since thets what appears on the shelves these days

I'm stamong up and down the platform nne-thirty-five Hsr than from Irkutak Marv. whom I ve begun colling Marrya lately has a very useful and cuite easy lob as a conductress (Little Sasha's in the creche we'll collect her soon] There's snow on the tracks and the air is full of white fights

Like a storm of souls blowing about

Here she comes the price of Russia headlarnos apov through the bizzato By my watch the exectly four-charty-live

A w As usual the train's exactly on time That a Moscow time of course The Trans-

Sheven ine has always run apporting to Moscow time. We haven't gone as far as Moscow ver, but this fact remards us of Moscow and the West wamping us.

The Possys glides to a silent halt.

Manya lets down the steps of her carrace and the passerpets stutible of their breath clouding the air like so many mobile semovers. They re plutching cardboard mont has plambered on board she herself

Bearing though stivering somewhat in her tailway uniform she weddles to me Gripperi Gripprosetkal

abrupty parted inpht up to the heavens.

For when the bomb exploded at Hiro shima many people's silbouettes work

And everything around us -tellfold en turbines, bakeries and distillenes---is like was monthed investivy by the registion with all the Soviets dead 1 know-for a feeting moment-lifet every building and mechine and thing we use is alive possessed Locomotives pastronoms buses and tractors, offices and ice-cream carts and nouble notes all tell us what to do and of Russian making aucked up their souls for safekeepito, and now they have enand the way these seem to well up, and

Theirs why no Choese came bern The land didn't want frem it wanted us so that we could have a long time to reperf.

Only there aren't enough of us yet to go round So we'll have to work hard to build up pur creat nabon

soon as Manya crushes me to far in her

Grawing back she peers at me is carcerned look on her face

"Step syam: Gripprishka?"

"Nothing a the matter, Manya, Alchivo?" Farther down the train, the driver lears from his cab

So long there?" he calls along to my

America is as with and empty and fer ago before any Asians hts; ineversed the Good-bye several hundred million deed

Manya links arms with me and off we

merch Like two puppets on a stage But no stands dance from the root directing and pur herves. And in our minds CO.





Science and art converge in speculation on the composition of reality, the nature of the universe. dreaming holograms, and the destiny of the hero in strange worlds

DEMÓNS, HEROES, AND REALITIES

BY ROBERT SHECKLEY

al begins with the cheater, so some say and no one can prove otherwise. There is a long testory behind the concept that the uncore data A Watter to Feed With This to cancer a herder and our care data a herder of an proving programma, and other and the standard on proving the programma, and there is introduce, content as he down play of posts well and there is introduced to the proving the standard and the standard methods and the standard and the standard and the standard methods and the standard and the standard and the standard method and the standard and and the standard method and the standard and an and the standard method and the standard and an and the standard method and the standard and an and the standard method and the standard and an and the standard method and the standard and an and the standard method and the standard and an and the standard and method and the standard and and the standard and and and the standard and the standard and and the standard and the standard and the standard and and the standard and the standard and the standard and and the standard and the standard and the standard and and the standard and and the standard and the standard and and the standard and and the standard and the standard and and the standard and and the standard and the standard and and the standard and and the standard and the standard and the standard and the standard and and and the standard and th icities John A. Wheeler and Field Wolf. That the universe is neither

cell A dearner might dream a world into literal assistance, and an-other determer might live in that world and himsell dream the literal shift as a form the machine of an and source

PAINTINGS BY ROWENA MORBILL

Each of us contains all the information needed to produce anything and everything, from a neutron star to a blade of grass.⁹



In recorded to the other than the contrast and the large of the second second





It takes more courage to be a demon than to be a hero. The hero merely rights a wrong; the demon originates the wrong.⁹



Lext the battle is work, and there I am. I'm the handsome gay with the magic relation and the unitality second. Notice this detects the just also it to a universal chean a continuity recommendation bratage I means that we are all the here and we are hereforme, more a comprison, were and, dreve all sufferentiable.

entrop (composed, were and carrier all refrestelle) Barroamp nois / Themphol on barroam barroamp noise barroamp noise / Themphol on barroamp barroampoint model of the second of the second and the second second and the



Yale's iconoclastic historian of science makes bold claims for intelligent machines and questions the role of human geniuses

INTERVIEW



In a of the listing puzzles of scence was posed just over By views tage when the nucleosing tage to be of an increment veck were brought up by (trains sponga dwan hom the disprise of the Avagens for and the brothant list of duy at Antisythes, an stand just weld of Davis Anrong the dispenced dual ideal to the train stands of the stands. The stands of the avagens for a stands of the stands of the stands of the avagens for a stands of the stands were not a dataget and the stands of the stands of the stands stands the stand of in metablypee of the stands.

The complicated 2,000 year-did, simil-encruted dedevold, howarded all attempts to driven as nail classifier. If an aeholdely, an interument for mensuring the shitsde of heavenly bodles? Or wail to phates an or runny is closeder planetarum or model free planetary system? Only one timp was cettain it was and handal compatier of ame kind—he catheol regime.

PHOTOGRAPH BY MALCOLM KIRK

Tocay a spoke (blown at why of the find stands on a surger sock-flow investment in a memory on Polypert Diserso between the stands of the stands of the stands of blowns between the blown of the stands of the stands of blowns and managery calification of series assertion instruments and blowd in the blown of blowns when Physics is to sock and instrument barries when Physics is to sock and an and a series barries when Physics is to sock and an and a series barries when Physics is to sock and an and a series barries when Physics is to sock the distants of the packed of the implementation and an and the physics of the physics is the sock and an another the physics of the society of the socie

Provide study, survey in plazar is the persurg a declarate in the history of science at Carrientinge University. Affecualt he came upwith new thickness over the years, the succemental nature of the carves emission a mystery until 1977, when he hit open the idea of using german radiography, and then X hears to see frequip the summ of correction that obscurts the taggentic (Pantisating earns, ration of the picture revealed that the necharrow-the oldert eviding relia of scientific technology--is a mechannel operation the soundary computer the cycles of the can and the moon is relation to the earth. The derivation of thesis operation of the can and the moon is relation to the earth. The derivation of thesis operation of the can be derived and the science of the can be derived and the decovery that it recomprises in otherwise. The reverse that by upward their ideas of the reverse that by upward their ideas of the scattle science.

The model of the Artisystem another the incode of the Artisystem and the Artisystem (in the Nat Sale as the Standbarg and Landbarg) of the Hartisy of incoming terms of the Artisystem (in the Artisystem) and the Artisystem and Artisystem (in the Artisystem) and Artisystem and Artisystem and Artisystem (in the Artisystem) and Artisystem and Artisystem (in the Artisystem) and Artisystem and Artisystem and Artisystem (in the Artisystem) and Artisystem and Artisystem and Artisystem and Artisystem (in the Artisystem) and Artisystem and Artisystem and Artisystem (in the Artisystem) and Artisystem and Artisystem and Artisystem and Artisystem and Artisystem (in the Artisystem) and Artisystem and Artis

From approximatel transposes, Fricani Invariantal transport di eventoscio the intertoriaria di transporte di eventoscio the intercety and the interzy and police et alono policy. Util the Bautinstative topola end more the 350 appare to have writen perhaps the batter the Bautinstative topola perhaps the batter the Bautinstative topola Bay Scionce (Columbia University Press 2005). A revisere to Planor magazena paradescribed the unitarity righters to apply scientific restrict of the writer intercedent of the science of apply of the topolatic called the revision of intercent.

Joegan no hurry secolary possiti, sanbard no hurry secolary possiti, sanhar no hurry and possiti har mean seame har more carrently estimated and the har more carrently estimated and the har more carrently estimated and the more carrently estimated and the more carrently estimated and the more carrently and the harmonic of second second and the harmonic of second second and the harmonic of the second second second second and the second second second second and the second second

Photo inspired Parkins when his described his own discovery of the law of the exponential growth of scientific iterature formulated alter wading through a complete set of the Philosophical Transactions 00 DNN of the Royal Society 1865-1850

The Contrologian where the wark Torto-May Control (the control of the control of

Knowledge works rather like a large ygsaw puzzle You wait until somebody puts down a piece and try to find a piece of your own to place on that living edge.

Scatca Catano holes: containing within in vancosity obstand burdings a complaine intervence lesting, in they heptises, of the will all all scattering burgers were published all were apprecision of the sector bormabor. If Philadelphias, which were stand with Philadelphias, which were stand with Philadelphias, which were all compliance data base in the wort all compliance data base. In the wort all compliance data base in the sector work all were compliance and prove the Adle of Sconce the Nat of many working that grade to comply the compliance and the sector sector all the compliance and the sector sector and the sector all the sector

Provisional study of the index has revealed some marvelicus inuitis about the shucture oblicion/edge that those further light on the potential of computers. Science purcelled Anthony Exercision and an estimation of the Take Outs and as its forme

Other How would you describe your indivalual approach as a historien of science? Proce: I count myself a specialer in any thing that links science and lechnology with some othar good scholarly ensepties such to history thissophy with or activational I by to bring together the work of the hestorian and a real understanding of science and technology. That is why I pay all these searningly cultancial things about the tuture of computers.

Orms' Your knowledge as a science histonen suggests thig the full potential of computers is not widely appreciated

Press (Thirk the computer sinvery much upbles and and only by the general pable, but by computer spottation. Not objected to avail the computer is an winnerly theng machatrather-reaching. It see the Age of the Computer as bong very series to the age with views standed accord. 9800 by the discovery of current electricity. The decovery spating a whole host of other host and all the gooders to care out of others.

Well we are now in the Computer Agotionity on the years after the initial cosis ing into being oil computers are mainteen to consoling mutations. And the revel tethwhole sense at new toothnoyse and is in the process of group through more than a centry of evolution. New gummittees of update accessing on the toothnoyse in a update of evolution. New gummittees of update accessing and have been updated to pay and being at that been tags with locks and the accession of computers are charging in their.

Ormal How far would you say has this evolution pone to date?

Today you can be a machine "Please imprint the offendial equation" or Field the pullhave to do the particular pain inprenect emprenerging "I welly impreceded with methems that can do medical diagnosts of papelinitian positions or algobiants mampanismos, or that can solve distribution that can dothy organic missicalist and pain with the can dothy organic missicalist and pain the can dothy organic missicalist and pain of synthaus". The machines are algobiant of synthaus the machines are algobiant to the third particular to the synthesis of the them to the synthautical particular to the synthesis thirds botts than human beings can be missical to the synthesis of the synthesis of the synthesis the machines are algobiant to the synthesis the synthesis the synthesis of the synthesynthesis of the synthesis of the synthesis of the

brink foor work analyzing the source work wide output of science has been based on computanzed knowledge engineering of a high order haant it? Peec Cred the data bases inter (persenwin-the frastruct Costmic Hometorn in Peissen Costmic Hometon in Peissen Costmic Homeand Costmic Home (Peissen), and the second struct dense of the Castmic Homeescient a three dense castmic Home entern dense part of the second structure mansarial structure and the second structure mansarial three parts relating to the second structure and the parts in the second structure and the second structure and structure and structure and the structure structure and str

Phos. Exactly like a road map with clies and viloges and roads in batware. The viloges are labeled with the names of the researchers and their organizations, or with research areas such as plate tectonics or A viroline antmen.

Otto: Down to what level of cetal doas the information ted into the bank reach?

Price. Right down to the key words in the abstract in the chemical abstract system. for mance, yourve got all the structured formulas and the biological properties of a substance fact. If yourve 2-thems: you as down at the terminal and put on the screen the structured disprime of the flow substance yourve massession in The computer dois up all the papers about the comparish durin uterate shared have ably put have marked and all the back. A second during the second paper of the second during the second paper the second during the second paper the second during th

Dent: How big is the pb of tracking total scientific inquiledge? In your took proce Snoe flucture you astimated that about sen inflion scientific papers had probably been written to until 1975 and that they were being added to at the rate of anyth human thousand a were

Proz. It's growing exponentially 'It probably amounts to some one-and-a-half-millon to two million a year by new---depending of course on exactly what you mean but a shartfun namer.

Other Given that number there must be an awful tot of duplication of topic and elfort. Well the Otation Index seve some of the duplication by signaling to advertises



In the measure that a vector board could measure there is no in the decision of the adjustment of a setting work is contrast to the setting of the

Phase Not, paracase the specialization foctor is constant. People tend to work in a little field of knowledge, of an order of magnitude dive hundred of entry people Water you add people you are really mailing the auxidiance strength and monther its maple. It chose very step of which show add person is again working with the same matther of badeal.

Boughly speaking we write a paper and read a paper a day. Therefore, year and read a paper a day. Therefore, we have to take in two or three hundred after papelles work in order to produce our own. So the number of papels in an investig college is and alledys has been a couble of hundred.

Ome: Are you saying that the huge numbers are a function of the expanding from terr of knowledge but that each part of the edge memians occupied by about two hundred people per tools?

Proc Busicity incomings works muter like sinely large galaxy busicitients we started in 1980, and have been galaxies and and the galaxy busicities and and and and the galaxy is the sinely photo and be concernedly phas been done always go unaturat semology phas down a pose and when he does, there are new concerned the states had and with the sinely of the sine pace of your own to photo on trail lines galaxy the size when here is accord constraints the subherior to solar the galaxy them and the size of the mutble contraint the size when here is accord constraints the subherior the mutble contraints the size here is the size of the first data the size here is the size of the size first data the size here and the size of the size first data the size here and the size of the size first data the size here and the size of the size of the size of the data the size here and the size of the size of the size of the data the size here and the size of the size of the size of the data the size here and the size of the size of the data the size of the size of the size of the size of the data the size here and the size of the size of the data the size of the size of the size of the size of the data the size of the size of the size of the size of the data the size of the size of the size of the size of the data the size of the size of the size of the size of the data the size of the data the size of the data the size of the size o

Deex Survey some bits of the ignowe are begger than others lant an Einsteinion beauthrough a gaint infutional short orout - a three-dimensional leap rather than a two-dimensional leap rather than a two-dimensional addron?

Phose No is a really not There are no seerate basekforups in hist sense il traugh of charae some combulons like relativity are more important hisi ohiers Welchoer www.set.kity what bisis/thoughs are and although tray are avesame and associated with people of carnt intellect

How to write a resume

by Jerrold G. Simon, Ed.D. Harvard Business School



International Paper asked Jerrold G. Smoor, Ed.D.; psychologyst and correcdow-lopment speciality or Internet? Baseneys School, who has convoled over a dynamic proble on their seems har pale, to all you how to go after the pale your really users.

If you are about to hunch a search for a job, the suggestions I offer here can help you whether conor you have a high school or college diploma, whether you are just starting out or changing your job or career in midstream

"What do I want to do!"

Before you try to find a job opening, you have to answer the hardest question of your working life: "What do I want to do?" Hent's a good way

Sit down with a piece of paper and don't get up till yos/ve listed all the things you're proud to have accomplished. Your list might metude being bread of a fund-rais-

ing campaign, or acting a juicy role in the sensor play.

Study the lat. You'll see a pattern emerge of the throngs you do best and like to do best. You might discover that you're leappies working with people, or maybe with numbers, or words or well, you'll see it. Once work decaded what

job area to go after, read

""Who can J? What do I source to do?" Writing your resource forces you to think about yourself

more about it in the reference section of your library "Talk shop" with any people you know in that field. Then start to get your resume together.

There are many good books that effer sample resumes and describe walely used formats. The one that is still most popular, the reserve chronological, emphasizes where you worked and when, and the jobs and rules you held

How to organize it

Your name and address go at the top. Also phone number.

What gob do you want? That's what a prospective employer looks for first. If you know exactly, list that near under *bb* Olyanie. Otherwise, saw it for your cover letter (I describe that later), when you're writing for a specific job to a specific person. In any ceae, make sure your resume locume on the kind of work you can do and

Now comes Wink Experience Here's where yeas hat your comes with your creak must guar most more tangushed work history in an an electrich

seeking lead

off with that. If your education will impress the prospective employer more, start with that.

Begin with your most recent experience first and work backwards. Include your titles or positions held. And list the years.

Figures don't brag

The most qualified people don't always get the job. It goes to the person who presents humself most persuasively in person and on paper.

So don't just list where you were and what you did. This is your charace to sell how und you did. Were you the best salesman? Did you out operating coas? Gwu numbers, statistics, percentages, increases in sales or modu.

No job experience?

In that case, hat your summer polse certractured school acrivities, beyons, awards. Choose the activities than will enhance your qualifycatices for the job. Next first ware Falecations-

Next list your concentration with that This should also be in reverse chromological order. List your high school only if you didn't go on to college. Include college degree, postgraduate degrees, dates comiered, major and minor courses you took that help qualify you for the tob you went. Also, did you pay your own way? Earn scholarships or fellowships? Those are impressive accomplishments.

No diplomas or degrees?

There rell about your colocations special training programs or courses that can qualify you. Describe conside activities that reveal your raikets and abilities Dod you sell the most rackets to the around clariny musical P Dal you describe a set of the set together as it works' These con help

Next, list any Mikinzy Service. This could lead off your resume if it is your only work experience. Stress skills learned, promotions carried, leadership shown.

Now comes Personal Dan. This is your chance to let the resider get a glimpse of the personal you, and to further the image you've worked to project in the personling sections. For example, if you're after a job in comparer programming, and you on the playing chees,

Obess playing requires the ability

interests or professional member-

ships, if they advance your cause.

Include foreign languages spo-

to think through a problem.

impressive action verbs "Created," "Desgned," "Achieved," "Caused."

No typos, please

Miske sure your grammat and spelling are correct. And no typos! Use 8½ "x 11" bond paperwhere or off-white for easy reading.

Mike sure your onginal is clean and readable. Then have it professionally duplicated. No carbons

Get it into the right hands

Now that your resume is ready, start to track down job openings How? Look up business trands, personal friends, neighbors, your minister, your college alumni assocation, professional services. Koep up with trade publications, and read help-wanted ada

And start your own "direct mail campoints first, find our about the companies you are interested in-their sine, locatioer, what they make, their competition, their advertising, their prospects. Get their annual report- and read it.

No "Dear Sir" letters

 Send your resume, along with a cover letter, to a specific person in the company, not to "Gentlemen" or "Dear Sir." The person should be the ron

> person in the area where you want to work Spell his name property: The cover letter should appeal to your terr from mech

Quickly explain why you are approaching his company (their product line, their superior transing program) and what you can bring to the party. Back up your claims with facts. Then refer him to your enclosed resume and als for an interview.

Oh, boy! An interview!

And now you've got an interview! Be sure to call the day before to confirm it. Meantrine, prepare yourself. Research the company and the job by reading books and business journals in the library.

On the big day, arrive 15 marutes carly Act calls, even though, if you're normal, you're trendbing made at 6.5 on the Richter scale. At every channe, let your mervicere see that your personal solid and qualifications relate to the yob at hand If it's a sales position, for cample, go all out to show how atticulate and pressaine you are. Adversarie, follow themath

Afterwards, follow through with a brief thank-you note. This is a fine opportunity to restate your qualifications and add any important points you didn't get a chance to bring up during the interview.

Keep good records

Keep a list of prospects. List the dates you contacted them, when they repled, what was said. And remember, someone our there is looking for someone just like you. It takes hard work and sometimes lock to find that person. Keep at it and you'll socceed.

What's in it for him!

Today, the printed word is more vital than ever. Now there is nove need than ever for all of us to snal better, write better, and communicate better.

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we know really how they work, and they are not mysterious. They we been instandenticical because they we been written about by thionisticians who never worked at alab bench and who therefore see these breakthroughs as gaint creative leaps of human cognition.

As horsonals, we traw understand there even the batter, indice as we the logic of asactify hore they happened. By far the more characterized and an intrometrial flackmassis. Somebody gets a radio telescope and new substance like Silly ATL; Bothe bat hat ever a parket of ultifs, to make as a new substance like Silly ATL; Bothe bat that ever a parket of ultifs, and that the parket forgather and you lift in the gapter of a basimizity. You als that techniques and of a basimizity loaking for batteria tak into the obstance of the substance like Silly ATL and the the obstance of the substantial barries the obstance of the substantial barries the obstance of oder.

Centri Even so sn'i Elle mo' a gaint lesp? sn'i tille adding say two hundred more ordnany pieces to the jigsaw? Don't additors to knowledge have different diceses di outific en consequence?

Proc Only moder as they may start of a lot of other things ables than lead nowhere in strategic significance as it were. Take the decovery by France Crick and James Watarin of the auchale helds stratument (DNA Here 1 focus upon the superb technical contribution of Readam firminin who could make very good X-ray photographs of marke very apod X-ray photographs of market to the strates of counts in the counts of the top of top of the top of the top of the top of top of top of the top of top o provided the encience that elisible Crock provided the encience that elisible Crock and polytakin a second theor is you get a chair maximum of them to be the elisible the magnitude. Which the to be the benchape produces a chair reaction in before the encience of the elisible to you and the financial constitution of the magnitude. Which is the elisible could be the elisible and constitution of the environment of the elisible and constraining of the one hand are all of any energy on the one hand are all the elisible and elisible the equilibrium of the elisible and elisible the equilibrium of the elisible and elisible the elisible and any of the elisible the elisible and any of the elisible the elisible the elisible the elisible of the elisible the elisible the elisible the elisible of the elisible the elisible the elisible the elisible of the elisible the elisible the elisible the elisible of the elisible the elisible the elisible the elisible of the elisible the elis

One: Enstein's E-mo² derived from instrumental results, then racher than from pure intellectual geneu?

Price Hight Enteries great loga sito depended a great data on the encomposa dvanos in matumentation made before herr (Albert) Michelson's measurement of the valority of light was not we knownedu as important as it berned. But a list of the discoveries in experimental physics were The new mathematical inchreques Ensen had available also foured large

What a wonderful about Entrater is that the same person who did special relativity and general relativity and the fundamental tring in photoelectric effect and in Broensamotion, and when he ded he was trying to do it aligner in accompanytism



The thing about genuess is not that they make a goal effort, but the ventry and arrays tho would need a cases often begin people to replace each one But in forms of the gattern of expending knowledge. If the generative persists, But is the hash of the generative persists, But is the hash people would have had to do them when the decade.

Owner It some people are genuses and scientific rotatis very in their halfaltiess, here does your index account for that?

Ping Nety casily What we did with the mapping—weak to make the different eness and impact of a paper or periors by the main extracted of a paper or periors by the main extracted as paper or periors by the main extracted as paper or periors much more fertile than others. You offere much more fertile than others thou differe insure the add a quality massare of people insure by the quality massare with the people shows to be loaded with regulate.

Their not to ally we always wint objective judgment of this kind. If you to review ing a person flor an apportment or a great you may also want to know what sort of person the conditions is it. For or she not also a good freecher a mos parton to haw ascurd? We went all those other chance trights as well. This soid, we can measure a well as soid, we can find

Devis The prime purpose of your data bank then is to give direct access to relevant accentic research that otherwise would be swallowed up in the vast and ever-increasing what?

Prime the sin increase we are at the dags where it is exect to do an experiment over again anise than the lot find in the public line and the sector sector sector and the sector sector sector sector sector med with a sector branch branch branch the structure of sector branch branch and with a sector branch branch branch the sector branch instance. Now we can any branch branch instances. Now we can the sector branch instances we will be the sector branch branch branch branch the sector branch branch branch the sector branch branch branch sector branch bra

Oren' Will still more powerful computers enable us to catch up?

Price Not recessarily Silos more powarful methods will also enable us to do more trangs in science the problem may become even larger and grover.

Onen, But we are now well into the phase where only a computer can atox and supply the knowledge relevant to work in soentitic research aren't we?

Pise Overall year The important tring here is that if you're a black entorhologist wolfing in Nancek, and you publich in your restitutional journal your work doern gerloar as n werk to figets fed in and controlled trainit thea that if you work in Nancek your journals come in six months like and your paper bacemes known a year later then semicen earlies. That a because we're no ying on the mail rather than electronic transmission But it's coming

Own/ Having been able to achieve total knowledge engineering of this kind with current computers what can we expect with improved models?

here how we book breard to what the Japanese are calling the Fifth Generation Computer which they am to perfect in ten years. Very scan set are going to have machares that think like human beings. They are already here in principle. We already have to deal with societal reaction to beams that are better than our own.

Owner So, contrary to realesurations that the computer is, after all really just a dumb machine you would say that the computer aniardy outamatic bie format base?²

Prece Sure Miton Fegerebour, at Mit Tows to smachner doorg region. There are upnear any sequence of the second second second second of the human team. We have a computer proof of the face activity declared in model, to defend the second second second second second dataset. If you want to symmetrize a starget programma existing teams and the second second dataset. If you want to symmetry and the dataset in you want to symmetry and the promovement of the you are provided to the promovement of the you are provided to the promovement of the second second second dataset. If you want to symmetry is the dataset in you are provided to the second memory the dataset shares the team of the white we don't you have a chaine program the opposed second second second second second dataset. The second second second second dataset is the second second second second dataset is the second second second second dataset. The second second second second dataset is the second second second second dataset. The second second second dataset is the second second second second second dataset is the second second second second second dataset is the second second second second second second dataset is the second second second second second second dataset is the second second second second second second dataset is the second second second second second second dataset is the second second second second second second second dataset is the second second second second second second second second dataset is the second se next international chess championship Great How exactly do you foresee the

Price Regist in the compare baselies making denty the white long and landstrang denty the white long and tardstrang of controllers with least anbear lands of the termination with the termination of the landstrang and the landstrang of the landstrang and the landstrang of dent the with with a single dimension in the landstrang barries and the meetaned writing bar mode down and the landstrang barries of and the with the landstrang and the meetaned writing bar mode down and the landstrang barries and and the meetaned writing bar mode down measurements and the termination measurements and the termination of the landstrang barries and and the landstrang barries and the termination measurements and the termination of the landstrang barries and the barries and the termination measurements and the termination the landstrange barries and the barries and the termination the landstrange barries and the termination measurements the termination measurements the termination measurements the termination the termination the termination termination the termination termination the termination terminatio

Now in the Age of TV, we are used to taking in a great deal of information with them to the second branch of particular them and a sear bot with the terror of tops. The masks are made frequential, the second residence of the second branch of the the same way as does the preservices pairs of the When we think who mind it ways with their in a pottom and the specific the When we brank with our mod it ways with the in a pottom and the others around serve of information.

Onvil At present the computer is still stuck taking in information and thinking in steps not intimages, lon't this so?

Prior 1% The comparison or cover at comparison threads threads the cover at the comparison of threads the cover at the thread prior threads and share. This is the discussion of the cover at the cover at the thread prior threads the cover at the thread prior threads the cover at the prior thread prior thread the cover at the cover at the prior thread prior thread the cover at the cover at the prior thread prior thread the cover at the cover at the prior thread prior thread the cover at the cover at the prior thread prior thread the cover at the cover at the cover at the thread prior thread the cover at the cover at the cover at the thread prior thread the cover at the cover at the cover at the cover at the thread the cover at the co

I think with my maids eyo all the time Tim losser seeing little pickites raise my head and manipolating them. When Talk I try to build pictures in someone elses head. Some people communicate with words I don't.

This is the difference between the Old Testament and the New You could put the Old Testament on a computer program. It's algorithmic—an eve for an every a booh for



stoch, the Colle of Hammunata You read Coll Feelaneth an stop by stop as you would Bobytonen. Egyptan or Mayen and You read i consume error shifts as you would a musia by Dago Rivera. In the Coll Textamet, there is no isangery no would puthan, no Caedait thering at all. The Disease tooght in quick anew thay. Whon Home toolatin, quick a new thay. Whon Home toolatin, quick and that is no loader computativate.

Omer Can you explain how Babylonian funking was linear sequential?

Proc. The Bolytonzon: Isbles of these magnetized automory read earchy like a compare particular a step-by step andyee of all he picturitary posteriors. Take this number add that one and dwale by theo yee of all he picture and dwale by theo on. The picture picture and in the picture where the picture are day atter day for a thousand yeers. They did this very socitably using value add theory.

Owni Did the Greeks replace this with more pictorial flucking?

Prior The Grades warren't interested in lincar thriking. They warred to see visually have the planets innove-have they parcent in endes and sets of loop the loop. They made geometric models—epicycles riyou lise. They drive dagrams and circlins

I'm waving my arms around as I speak If you were a Babylonan you didn't need to wave your arms about You talked in words and each word meant what it said and wach skep was ispacified. You had a program in the Code of Hommunata you had a program for the law. You find in a creamstance and it ske you what to do in Roman law or modern law you have to conceptuative and weight each films aguest ach other thing. Its not prescribed You can't do modern law on a computer. You could do biblychamiliae Mouth.

As a tratonan I see an evolution smiatr to that of human thought at hispporting with the computer We will be able to teach the computer to go tram its present. Babylo nan style of thought to the Greek style of there or a poctures.

If human cognison had not advanced any since about this time of Human than the art of artificial intelligence would be almost perfect by new As it as is intelligent deficiant 1 such the next status as producing the hardware to input and output pictures at al green without scarming

This will come closer to the way our minds work is an entropy way to Wayn two-chmemorial hardware is replaced by Preedimetaconal hardware the result wort be perfect Analoties in logic anymore. When you do in these dimensional while a close does in two for various teaching you get "kazy set" logic "tou get a computer that can jump to conclusions that can make way human modeling.

Onw The computer can their in proteins though it can present an image on a screen and even turn a balancent mape of a solid



object through all points of yew

Ome And the computer leavese needs to acquire a brain that thinks in images That real strop is a grant pre-shift?

Prove the instance from the derivation of the three sectors of the three

Ormel imitating the brain's work is a very tail order real if?

Price Not naily fou could not and posibly exceed the capacity of horizon with scientificity as treat as a full-continuity meeting as treat as a full-continuity connected by the science of the science of connected by the science of the science of than we can with the work. There is no relation and why re-indexing the science of the test means that the science of the science means at the science of the science of the test means the science of the science of the science and the science of the science.

Following the UNA revolution in this sign of genetic engineering, we are beginning to understand the mechanics of living threas. Deast studies have been made in neurophysiology and we are more and more coming to fathom the michanism of the brain. If these sciences link up with computer engineering they will necessarily form a hugely line line line.

Ethnik the next mappr event is the history of concrete almost participation has to be the cross-services of extract metalogous and the computer As we better understand the bian we will better engineer computer hardware. We have not got very far yet Out then the holps for all here complexing tocoles not burnen bettere

Ottor Still on t a 3-D technology for the computer a memory and logic rather far in the future?

Phose I don't think so. What I envision is say a continuent cube of management crylat with leave beams importing on it. Where two or three beams importing the try to be atom to make a big. Now you allow through a big where a big how you allow through it alty dependent on and you'll doe a percurin alty dependent on and you'll doe a percur-

Only Will this be related to current work in three dimensional laser-beam picture making or holography?

Picel There may be some link with holography buil Trank probably not Holography would be very rice for reacing an but not for reading out. You can reempulate the data. You re just photographing in Thrik it is going to be done with crystal lattore 3-D grids that are accessed by midding war barne in the last very midding war barne in the last very a number of key patents have been issued determining which orystal lathces you can read in and out of together with the lazebeam tackingue of multiple electron res orange that produces the effacts Paciel have been mocking up three di-

Inspective bein mooning up tree or mensional logical by simply building a building at the second second second second second getter—bin by len by ten—and connect them up and second second second second access this take demensionally. The result is lifted unexpected it leads we to before this is really the wave of the fourse

I know that all two leading computer firms are thinking of this. One that linder is with latitore of new substances that are particularly good for memory units. Another uses protein remnonductors—the so called living computer brain. Possibly we really will have a protein the harmor base itset.

Gree Do you believe that Einstein's brain was befor engineered than the normal human brain?

Proc 1001 claim to be an expect on that pencha subject but inty paiss for white CS worth is that the ofference botaken indevidue is actually interior in the sufference like in the handware—a mather of actual to Thirks that differences in moties daposities, but I thirk there are insuch toget human being that in the botaken toget human being that in the botaken toget human being. If but is able more their insure



Owner Do you believe that computers will become more intelligent according to how they are programmed? And if they can learn to program themselves, then they will be come supermetiligent?

Proc. Those are very interesting assetions: Rive can get a comparison to first key much the same processes as a human and give it a haps interestry of with the stlamments of source thus far, and taken judgments with the same sort-of-aluses and judgments solentats use we bould risk it improve strategin intelligence stell We could ask it. What is the next step? Who would you live us do?

An some sy pur here a machine that can improve data in this way you have in a sense the ultrated discovery Cli noolsdis such a machine wait eventually oble alked Downsy's Clivent be able to do under another and the sense of the sense that many the sense that any all the althouse y strying mathematics all the althouse physics mathematics and so on the Cnie bad he to the field bad in the integration antifield bad in the integration and bad field and the intelligence amplication is the field bad in the sense within norms.

Otest Including the possibility of some kind of perfect intelligence or infinite capacity? Price: Yes

Genes Just as robots have taken over from human beings in manufacturing, so computars will take over in jobs that require brancower?

Prior Three is no need to use a turant being for digeting your layaffers of a formation and matricularly all with save the save and the save and the save and the save the save and the save and the save the save the save and the table. The save the save and the save and the save the save the save and the table save the save and the save and the table save and the save and the save the save and the save an

The second secon

And that was a temble thing Poor lette old Baliko with the small bitan -- he wasn't a very considerable professor at the small Otherward and an a

Wormholes and other strenge beasts once populated the universe that Einstein built: now theorists are having second thoughts



BY MARCIA BARTUSIAN

Over the last 30 years these as- has guided more than 40 gradu sundarg decoverer have made is control to the severe res gat-leg and traveled. The population the same that the severe res gat-severe reserves and the severe resolution applicant building controlship applications the same traveled is the same traveled provide the same traveled the same t

other celestial beats have last and poking his note late and poking his note and public has had fun believing in innurverse with only a pencil and these bizarre objects, because they lided in so mostly with scaence lictor," says Kip Thome "But to theoretical physicists, they're only pert of a game, a fice-onating methematical game."

lessor of theoretical physics at the liums out to be huzen energy, ob-

scipting quasars. Step- California instante of Technology man mailton store later. he has halt up one of the work?" stellar molecules that sing leading century of block-hole recul oue radio tones and the da- scorch. Since 1996 the notable sonant challer of the universe. forty-two-year-old astrophysicial tounding discoveries have made alle students and positiocional re-

International and internationa piece of paper, his favorile grapefruit soch neer at hund.

Many who fail under the spet of Constem's veron feel a ktile kise Al-Thome should know As pro- nouser and canouser." Matter

PAINTING BY KAZUMASA NAGAI



sets shreek as they have save light basins body as they sen the suitable of the sunand growy is no longer if force tracked is a converse of source-time static. The more mapping an object the more of body static lighting dimension contrains, in which the rubber may have been dimensioned in the state of the suitable state of the subsort in the state dimension of a listorial direction by some more listories direction to the suitable the suitable the suitable balance to direct the suitable the suitable the suitable listories direction the suitable the suitable listories direction to the suitable the suitable the suitable suitable balance to direct the suitable the suitable the suitable suitable balance to direct the suitable suitable the suitable suitable balance to direct the suitable suitable the suitable suitable balance to direct the suitable suitable suitable the suitable suitable suitable the suitable suitable to the suitable suita

These ensures changes in car were of the university final fault of a loss for merry with when finateness final cards of a loss merry with under finateness final cards of a loss final fault and the second second second second second second and a loss of a loss of the second second second and second second second second second and second s

The black hole of course is the pro-

possitivementarial al physicial that his too clulagead down and bocome an object so donse than not even light can accupe to severame guidated and that they have to hear accup block lever. Twey have all accupations are also also all they are backed on the several dimensional Centernors and they are also also all they are have they impact and the have the several that and the several several and the have the several and the several several and the have the several and the several several and the several several and the several several and and they are responsed. If the university the several several and they are responsed.

When balas are remoringed of balas, and, like occurs preperts they acchinicity and the matchine analysis And Acchinicity and the matchine and the second and acchinic family and the second acchinication of the family and the second acchinication of the beams and experiment of the second acchinication of the preparation of the second acchinication of the previous acchinication of the contract, hypertenses a not hall to part to appear that the previous speak in which we place out semplification of the second acchinication of the second acchinication of speak-time. If the second acchinication of the speak is a set of the factors acchinication of the speak is a set of the factor of the second speak is the second acchinication of the speak is a set of the factor of the second speak in the speak is a set of the second speak in the speak is a set of the second speak in the speak is a second speak in the second speak in t

Science-Intern wate addition water the turnels. Science science is be handing them an outflexibility filepitmical means of pimping shaund both space and time. Such water-work plot devices as hy persoage drives and pime middlinka work



beginning to look a little more plausible.

And there here so publish the reflections, Through howards and obtained the operations, Through howards and obtained constant that black house waily do only. There says, This is 10 from of the basis wails of the start and and the operation of the reflection of the start and the start of the start wait in the basis in the start is start of the the start of the start wait in the basis and the start wait is and the start of the start wait is the the start of the the start of the the starts of the start of the the starts of the starts of the the starts of the the starts of the the starts of the the starts of the the starts of the starts of the starts of the starts of the the star

At this glastic Thore expenses to be all unlevely spokeran on this inform working of theoremical, physical, His full defines suggestimore a bolemain calibration of the Goose tane a physical But there could hardly be a macquilled expension of the anyon in expension. But there cauld hardly the theoremical But there cauld hardly be a macquilled expension of the anyon in expension of the backing work with high could be anyon of the backing work.

Ahead of them a blockness was earling the sky. He was dmity assess that they must have crossed the event horizon. The line want things vanished former—line and space tooethin.

-The Black Hole

The serie back hell was contain in 1969 by the clean of American relativistic John A Whole moust the Unvertisity of Door Unature that the Unit of the Series and Door and Series and Se

Bit nor back hole want the lead length and The farst last backford control solution of the solution of the solution of solution of the solution of and calced withit would tappen if all the guarty. He band the solution of solution of any calculation of solution of solution of the solution of whigh to the solution as the "weet forces because on evert the course radio to solutions on evert the course radio to solutions on the calculate its the solution solutions on the solution of the the solution solutions on the solution is the the solution solutions on the solution is the the solution solutions on the solution is the the solution solution solution solution is the solution is solutions on the solution is the solution is solutions on the solution is the solution is solution as a solution as a solution as a solution is solution as a solution as a solution is solution as a solution as a solution as a solution as a solution is solution as a solution as a solution is solution as a solution as a solution is solution as a solution as a solution as a solution is solution as a solution

It Earth collepsed to sport, it would have an event horizon with a proumference of

About aix centimeters-roughly two inches mon there would be no way out only a

own sun the collepse never stops. The star she laws of physics break clown

diriction and that there should be a law remaned a mathematical curbaty until the 1960s "Al that time, aimpel sinclehaort edly John Wheeler led an aftert at Prince ton to bring these biggine objects back to

According to Thoma, their effort condepris that can obtaily be found in the sast with ease "The initial conditions for

Statelity was a tougher ontenon to meet prined their hopes of killing of the black vears and Thomes proficient graduate

Referd Price for one wondered whether a black hole could form if the collapsend





emailors were streed by the wonder ful sound of someone elses high rideby watern? You found youne't not are

confusion of kontra and shake

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gravitational waves, as some had hoped sown Powers Alass the black holes couincorrigate, and the while hole-suc-

ration of stars and Rud John subtenly nar-

As early as 1916, Luckeg Flamm an obfinitive number mat of space-time bend down so deeply that it dropped through not necessarily have to go to another unverse if gould also connect distant mozons.

"All this was the hot looks of discussion over beer when I was a craduate studers never took it senously it was suit a cuter We had a gut level faaling that it was such

Plasma chytocat Martin Kruskal of Principle, came up with the fill persuaclaying amund with talightly equation? in the universe. A standard black hole, after all is born in the collegee of a massive star-a real denseen of the heavens. But womstokes called for ready made ports of whote decays And how area they police out. You have to have a sort of relicious

each with its own singularity sitting within a bideo is the Then like some cost of tons the wormhole for a short time and und an ourchly contract and seconds. The for anything to get across much to the



chagtin of Star Trek lans," says Thome By year meson to obliver

Chancels what ever desper into that 56kg mates created He let no aimp no werp. he saw stanic seventy Christok had zisseed through

Thoughts of magical jumps through space and time did not die with the wormhole Tunnels through hyperspace also nonned out of Einstein's equations when theoreticians took a hard look at more complicated cases-collapsing stars with a be of electric charge on them or with

formulated back in 1917, when a German named Resister and & Darish scionist named Notdatriam looked at an electrically 1958, when two of John Wheeler's studants Deter Brill and John Graves: worked out the explanat of the Ressner Nord-

What they saw was the Time slows down within a strong gravitational field, and black toies carry this effect to the extreme Ar observer atting on that charged collapsno star after a sinks through the event hopublicle in pur own unwerse

A social and principle and the collegest cent ecen According to one scenario ring of time in another universe a costrol verse and forms a little capsule a kits closed universe of its own, for a fraction of

Ematern's equations don't really deends up teaspending sometime mour peed

Boentists don't reely expect black holds to be electrically charged, the charged particles in space would soon neutralize such an object. But a rotating black hole has very seniar effects. And when black

CMN

SPACE IS SURVIVAL



WE ARE RUNNING

nearly over Three will be no US spacetrift sonding beak photos of Halley's Corret, of Mon, or Utorus-or enywhere shell

Find out what we are doing to help Write to:



them rotating, just as the star from which they were formed

The appliancy of the control is totaling block to even usible ennor a point but a ring Some have speculated that a work-arrow purgethrought from right center would blee you to those other unawakes and other times. This specials for sourcempt were deep inposite. This standard with the source part of the source of the position of the source of the source of the position of the source of the source of the position of the source of the source of the position of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the position of the source of the source of the source of the source of the position of the source of the source of the source of the source of the position of the source of the source of the source of the source of the position of the source of th

And anyth is entries to prove share uses Rope Tensors was the first to use at a Order University, was the first to observe that any other than the state of the walks. Mather and to include the the seconds to its work foreign the calls was to before the work foreign the calls was at the last tool at the control the second the too the second to be collaring that the too the second to be collaring that the too the second to be collaring that the too to call called with.

Percense says that have workd be a terining less of anter energies of security energy more send more energies (ail glassish becartie have been and the security of the security of the days of the security of the security density, uses Theme, which grades had of the days of glassish and have the of the days of glassish and have the other is been a security of glassish as doorn needer energies hand you end go with an other includer of a control model of the other is an other of the other is an other of the security of the other is an other of the security of the other is an other of the other other other is model of a the other of the other other other is model to all the other other other other other other is model of all the other other other other other other is model of all the other other other other other other is model of all the other other other other other other other is model of all the other other other other other other other is model of all the other is model of all the other is model of all the other other other other other other other other other is model of all the other other

To Price the instability of such tomats in a sign of the good tasks built into the general theory of tasks/of The universe has retained instantly We no once if have to warry that our generating-gradithinen could ever come back and kit us has cutting to shreds the principle of causally Foton, for now tensore stranger due to the

Sanathing obe impossible was heppering Light Light should not happen which the carbine of a collegion. He imagined it had to be should His lipidou here turned to the possible existence of white holds. Ande wounde and other unverses. The Back Hole

The Black Hole Alter Dean Frailer

Hencery years ago attributions were skinned to clocker that some startle objects were pound aut encouncil allowate of radio energy Located a ter biblion lightgens to the calcular bioletary of 100 biblion super locate. These queues related and the set of the set of the set of the system carcular is not calcular biological could see that hage gits of matter were biblioned with the such and the biblioned with could possible to mantime such in mental and costing dealth of the such as the set of In 1964 lessel physical Yuvai Ne onan, new lessaha minister of science and as Russian astrophysical, por Novikar Incupt the while hole would be a possible anawer When holes are smyly block holes in textus lessed of an event horsen it sign how as anti-event horsen a sign of space whence things can only come guiting both built that robing can erfer

Naterian and Narkov had an unused application from the could corre allow they suggested that lagging color meand solatisatic allows that the collsense they are suggested based that had allowed that collegating the solation that allowed that collegating black holes in the binary same landing that all grants. Other suggested that collegating black holes in the universe was landing that, black hole allowed that collegating black holes in allowers and solations that all grants and allowers allowers that that all that all the allowers all that the the solation of the solation allowers allowers

"At the time a small handful of astrophyscosts took two when hele help bypothesia very aerousity is alway. Theme, "It seemed impossible to explain the entrmosis power tophal of qualeers in any after way." But in 1974 Dauglas Earliery decided to take Einsemi's equations and see what would help pend in by of malfar when hothed toward a lisconing core.

The Baging core turns cut to be as 46 exp predensis of basis. If this a grant table of the arging the second second second second experiments of the second second second experiments and the second second second with the second second second second second tables of the second second

The year between more period reactivity. There says "you have to accept the lact their when holes have noticing to do with anality they are au unstate on the turnels through hyperspace. They do a dealoyed by any sinky adalation falling in Xward disan Luke the other boars members of the course control adalation, one tool do not take info accepts in the course did not take info accepts in the course field with just and matter

isoncally imary theorets not believe the a rotating back toke may be the control dynamic nationalities for the transmission part of guarantial and the theoret of the part of the theoret of the theoret the galaxies, according to the model states the galaxies, and magnetic fails are part of the theoret of the theoret of the the galaxies back hole weating in the galaxies to the theoret of the theoret of the meeting the theoret of theoret of the theoret of the theoret of the theoret of the t around the hole's equacy. Huge amounts of energy are released as the material spinals beneficities the black adapts and an opped solution of the black adapts and an opped situation of the magnetic holds thread husgins the husgins and while association the solution. The immersive generated while as costion. The immersive generated while and costing a perpendicular shared with a solution. The immersive generated while and costing a perpendicular shared as and costing and perpendicular shared as and costing a perpendicular shared as and costing and perpendicular shared as an operating the shared as a shared as a shared as a shared as a cost of the shared as a shared as a shared as a cost of the shared as a shared as a shared as a cost of the shared as a shared as a shared as a cost of the shared as a shared as a shared as a cost of the shared as a shared as a shared as a cost of the shared as a cost of the shared as a shared as a shared as a shared as a cost of the shared as a shared as a shared as a shared as a cost of the shared as a shared as a shared as a shared as a cost of the shared as a shared as a shared as a shared as a cost of the shared as a cost of the shared as a cost of the shared as a shared as a

As far an the laws of mathematics refer to reality they are not certain and an far as they are certain, they do not refer to reality

Now that the chark out has settled how this fully of proofs and counterproofs only the fully of proofs and counterproofs only the black hold has surved. The challenge is to find construintly proof that these most filtows (creative) and black hole model explaining the entropy of the queere and a number of puzzing X-ray secrets that licker very ready in the size.

One of the second second to be the second se

"Such phenomena is the quasar pts and Cygrus X-1 are assly asplaimed by dark holes. Thorne notes." No one has found a bitful asmwer Buc the evidence is on curristrated We still cler these a signature correcting jumping up and saying. I am truly a black hole. That will likely come from detecting preview weeks.

Carrient intensity precisits that as a massex object accollenate or womenter in score fam way. It will cend aff gravitational wived—opplies in the loar therestore is go of spece-time. Theory says that very weak ways are produced as the earth orbits the sun. But obtectable events, well come only from more spectacular overfa, such as the formation of messave black holes.

In projects row being allowed association the world heavy cylicities magnocially autoported in space and larger begins are licited between multiple marss will be used to record the tree distortion of local boots think grantisty as the multiple project provide and approximation of the space frequencies of the space of the space of the two static and the space of the space of the two static and the space of the space of the two static and the space of the ord heavy caused and multiple the only and of the space of the spac

In the meantime the block hole itself is taking on a new look. The brillight British physical Shepher Heeking suggests they block holes may not be be block wher will hall here may gee of elementary atomic phrtolos Space-here is a beneficient and block hole. Heeking sugs that a part of particles – aparticle and the avent horizon. One particle durageness in the block hole the strategy part states way reducing the holes mass bit

For a mplate back hole the exaposebon's pix about memorgine, A thick hole with the metor of our survivouid need mesotan's 70° years to exaposite Built having says that minitian's that could have been born during the fast structure moments of the Big Barg. 30 billion years ago II so, an Oper with the misse of a storm nucleus wold be diright should have been wold be diright should have been leasened to the stere of a storm nucleus wold be diright should have been a been with the theory is Associations of parms says. Associations as a store of parms and a store of the should be diright to the poor

Accelerating to warp one isn' As Suku began making the helm controls. Kelk could beel the studyt maketh of intrasport rooms

Almost a century ago the first successful quantum keep of a stemphy into warp driv made heah of all these theorems baland or too nemow or unmagnative an interpre tation of Lonstein's work.

> Star Trek The Matern Picture by Gene Roddenberry

It seems only seclinds is that to the moveherth-contray seclinds were limity size, ing that the laws of physics would generate that from from (reg) belaws-thank-or me chines are tooly is relativity for more bitaine solutions to Enclinens exclusion¹⁰. We is all hears to work and the population that rese static which only and wormshold solutions will be which only and wormshold solutions will be which only and wormshold solutions will be only only any from the body at the markenistic cost appendix that the list is right nor puter sociation.

The series of parameters is a mathematical parameters of a physical at a Marcines Show Linewesky decovered a very applicatuation mathematical learning with a sequence of a mathematical learning with a sequence show the mathematical mathematical sequences and the sequence of the sequen

If their airs any surprises security the connet, they are expected to come when soenaic can traily untergravity with quantum mechanics—the lass of physics at the atomic level—and one unitying theory (domain/atom) to sole observations those to face the infinite forces and densities of a securitized under the mechanisms.

"My goess is that busine things will be decovered tity years from new." Those says "But they won't be womholes and white holes. They't be things that we have not even imagined yet. DO



NEWE Michael J. Lawile MONETOWN Broaddy, New York CEREDYNERSCONCE, California EDUCATION B.A. -Philesophy, S. UN Y. Stoog Tanok, New York OCCLIPTION Comparer Professional HORDES: Recordfall, backethall, anto mechanics, Micking, philosophy

AS A ROSICRUCIAN, I HAVE LEARNED TO CONTROL MY LIFE

Several years ago as a college stadent in search of such lifested myself collecting using using select that all not registry to my 160 cm having, short frie Rosenschin Orden, I was telepitol and pert time torongheng in durine. Destaulty 1 becense ensembles—and that was the most reword investor likes evertishen.

In a bioectroom. I have learned to develop the specific autoencode we intellectual levels of my musil. With this new exercises. J one deal with people on a deep and prostee level attracting hermonous conductes to my sensorie relationships. I have also instrud to mention an excellent state of haveh.

In short the Resonance teachests have put mean control of multile

Taday Hock within mywill to understand and control file stantons and nely on my intuition to guide me in docume making and problem solving. And ance there is no limit to what I can limit i full be allower control for allong all can

The Rosenzours are a faternal, cultural and educational organization and are not a religion.

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A moving least enriches the desert and nurtures hope



BY NOEL VIETMEYER

In this modern garden some of the frusts and other cross true between instead: freed time inselem morrings on Earth, perspring to journey info gazds. The plants gaps in strong and then through trund as no convey to the plants gaps in strong and the through trund as no convey to the plants are plants and the strong and the plants of the University of Antensis Environmental Nationeh. Lateratory (FRL) more The Son Apport Them's other of the research and applied the through the plants are proved (above and right) threads of Bloot plants cyclicity Song and Strong Antong and Strong Antong Antensis gazds cyclicity Song and Strong Antong Antong Antensis and Strong and Strong Antensis and Strong Antong Antong Antong Antensis and Strong Antong Antensis and Strong Antong Antong Antong Antong Antong Antong Antong Antensis and Strong Antong An

PHOTOGRAPHS BY MITCHELL FUNK





The challenge was to construct a farm on the stark, stenle ground of Sadiyat Island, where winds whipped sand into the salty av



in a simulation of an orbiting lood station. Grean leaves home in on a fluorespent growight. Retailorshill forces tug regts into nutrient met.

Original y subvigit: Realitability in the site is grant and an end of the site is a site of the sit



bord total part control to the post of the set. Sold the part of the post of t





FIBEROPOLIS

Etc. and S. Euritathe are not places you'd extend to find high technology in Tany on teen try, toware on the Manisho prantic logation frame on the 700 popels. Else, 30 million weak of Vinneyse, just off the bury Tame-Canada Highway, consists of some model housis distributed instruct a grant elevator that a value million sway on the Italiands. There are in causite of I inchronomic onla automotion and subde toxicid the turbinety, and the does not want and automotion and subde toxicid the turbinety. Into I does does many a commanism.

BY JEFF HECH

Talk to your television set. Play games with the master computer, it's all part of life in high-lech towns wired with glass

part stikeningsmageneze elektrologi, 1% Eurotechie, a dow mieles north of Elekteerner steeper and microe spread out, steera a laren visitge tran a lasen Maot al the findle prime is under calibration, molecular farms typecular grand over a low space molecular descena of the resources are to film the lareness Many are working-dess treammoles with table is Winaparg who grow up in or man. The and have strayed or come took is order in and date the landers.

PHOTOGRAPH BY CABL FISCHER

Instance once the a problem in such rolls and, if is not bole of the is amore onbase, if is not bole of the is amore of the such as a such as a scalar in the sum of the bole is some pany of an is scalar in the following and the such as a scalar in the sum of the such as which will be an interval and the sum of the match being and the such as an experiment package is an interval as a scalar in the match being and the such as a scalar in the match being and the such as a scalar in the match being and the such as a scalar in the match being and the such as a scalar in the package is an interval as a scalar in the package is an interval as a scalar in the scalar interval as a scalar in the scalar interval scalar interval as a scalar int

The East Set is focused on a new leadnoday that is approximately a strong down in communications (beroupids). The orbit that barge tom Ealer the traditional classes and is barged as leads to design the point of the time of the tradition of the set of the set of the time of the set of the set of the set of the time of the set of the set of the set of the time of the set of the se

Permitti por tra tas experimente Sobili encomen elegenterra 100 annabellaria a mor la suali ingle sel indige como electronica electronica de la como el como electronica en la como el co

Fibialoptics is one of the needed 01 by day hot jerknowne yna niadau it i ea a a crist a worder drug for her irio mor, en communication and at Elie is a chicat trai What Ibangiasa dona is to when one for all products by more the limits on hoe much internation a angle com munication of approximation in angle for angle is not product to home a limit. Subsequence was a state of the angle of the product of the state of the appear angle of the product of the 2,550 hypert pages of her per second of the const. about 1300 interference conversations per second A: Boart a pair of this/phone wrise aim camp about two docen conversations a table and then only by umps pecual drafs thand into facture and a 1000 consequent leaf may be more than 1000 consense at leaf and the bar more than 1000 conditableaution and the second and the second setting that the second and the second before the second and the second distableaution and the origination of and the second bar and the second and the second bar and and the second and the

The technology gpt is start in 1968, when two physicistic Datakes Koo and George Hochem then working at Startfand Telecommunications is international in England—suggisted the stea of making optical basis good enough the orientumcations but reason utilized in 1970 that the fast and good enough the orientum-cations was made at the Centring Glass Warks by Ritcer A. Mauar: Achievements inside them

Fiberoptics can bring telephone service, letewision shows, computer databases any medium of communication—into the home over a single pair of glass fibers?

Investigent information By recturing the parties to the parts per-tellino level, engineers have made gases libers as hanne perent that lights can taken to a supportent that lights and the superstanding balance even half of it is absorbed. The orache server as therein "Necessarian ward listighters Laborationes have transmitted agnals over "On kilometers of unmitterupped faber Window galass it multip the "See faith counters engineers have ad-

By the solution of the solutio

Puting the pieces together provides a toperophosi coordinacciations, system with some important advantages over conventoma attematives. A angle penci-thin the benesitis cable can carry more intermation there is buildy metal cable as large accurad as a ministr mit This several inbenoptios cables can be essentiated in the same space as a simple metal cable. And when that space is in consider beightner cache simple boyo offy attemation to the And accurate and the space of the cable and can any mit down of balanching chemistry.

Flearappics cables can carry inform the proper set of the physician set of the mains in that therein the set of the physician region of the physician set of the physician set of the physician set of the physician set of the set of the physician set of the set of the physician set of the set of the physician set of the physician set of the set of the physician set of the physician set of the set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of the physician set of the physician set of the set of the physician set of th

Teleptore comparises are already and time transports to work connecting awatching offices with interesting connecting and the second second second second second the northese condect between blacked and Westington LC ... Namilian is based told the contrast condect between blacked and Westington LC ... Namilian is based told the contrast condect between the told told based and the telephone cold to detes called. By 1958 theorem to based oceaning phone calls under the Alamic Ocean and then the Backte will have a cable liked under it.

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The most innovative semicle offend in Elea and St Existence is Telden the computation information or videoles services developed by Descharge to the services developed by Descharge to the services developed by the services of the services developed by the services of the services developed by the services of the services legitimet and the services and the services and also be used) and a box of telertrontion takes be used and a box of telertrontion to care use in an alked of automators community updated aimmans, starting by perhaps a permit category such as welfint, for countryle, then interflying the perial perial period and a start and categories or subaubcategories. These are able code numbers that will be also update and an analysis of the start and perial aintermediate ones. Though is can be somewhat ourbaneous and explants and interflying and analysis for a guidely intervals, or what is the weather forwards, or what is the weather forwards.

Teacher a sait evolving veropie scoper aports The system is not backfing to other annotation that reads the unit state and the second state of the certary cost in fur background state of each state characteristic state is orderary trings that have been selling. Too analy second state of the contract state during the Christmer second state states and states of the comparison states. The second states of the comparison states of the comparison second states of the comparison states of the comparison second states of the second states of the comparison states of the second states of the comparison second states of the second states of the comparison second states of the second st

Interactive programs such as games and educational downais make people "tight up". Tough says, though simple information ontowoli events "cidal and formal in comparison. Childin are especially enflustance lund by such propie computer games as to-reached biological, and the old word game hangman. Leps says. Ne-Man and other video games unvit differed yet although Loos stops that some are in the planning stops for 1983. Nat children ted use the gaines so much that informat hadro take them of the arks prevent Computer overhoods with new exoputent could be installed. Game playing ted up the termulal ZEDE's regretal high subclish sold although that it was finally behind in favor of educational processing.

Many of the chrisem in the accently have explored fielded and the could be immeritied on the representation of the could be immeritied on the representation of the could be immeritied on the representation of the could be immediated in could be accessed and the representation of the representation of the could be immediated in the representation of the could be the representation of the representation material for follow-immediated in the determination of the representation of the repre

Bildon has other practical options, including an extensive store of agricultural information. This is important to Victor Beaudin who tarms neity three square miles of practice rear Elle. He uses Info-



marts Graperoots serves every day to druck the warth grain blures, and hog protes and to get information or what to ally them. The service is to valuable into Baschin age the diomonic playing 150 a month for what is now the as part of the see and interactive similarity, aprilocity the chance to stars located on the playmagiant yields—noostary/for success in the size of yields—noostary for success in the size of yields—noostary for success in the size of yields—noostary for success in the size of the size of formation.

"The of the most isolate yours takes make that budget is a pulse totation. The Easterner waters is a pulse totation of the Easterner waters is a pulse totation of the the source of the source of the pulse is and the source of the source of the pulse is and the source of the source of the source of the contained of the source of the source of the contained of the source of the source of the source source of the source o

Berlow the liberopost system curror is liberioan repective weil intered to biodicast nom livingag. "Bind born dyng of the Department of Communications, and the system of the damage of the system of the system of the damage and based 28 means were associated as the system of the hubble Broadcastry Serence may part of the amage in the theory based of the amage is the Berg Dynamics in clearings and its hombing brundles in clearings and its hombing brundles in the based of daw up software used in high brunch have based on the based and the system is the based of daw up software main the interest of the childrent seven of

After hving with the fibercotics system for a little over a year, the people of Elie have quietly made it part of their roubite They're very ordinary-seeming people much like those in amail towns scross the United States, and their information needs people Hida Marters needs to know the wrather on a writer martino in order 2 decide whether to keep the schools open ap she consults Telidon rather than the radio. Her husband uses Teldon to check working in the Canadian Artho because carpentry robs are aparop around Wintepeg The Martenses Ind the fiberoptics system heipful in one of the tricker lobe of parenthood-find to babys fibrs, who en by playing with the system

The Ele experiment is achicolid to end in Narch, althe 18 months in operation. The approach—the Department of Communcations, Numkosa Telephone, the Carne data Telecommunication Carriers Asacciadion. Nontherm Telecom, and Monartplan a survey than to learn frow much money participants would be welling to pay for the perveces they iscaived and to see hear to achieve month terromoval. The sponsors also hope!" to gat a feel for the subscriber a time budget i m Tought a words... to topic out fow much people will use the services. There is a chance that the Ba system will be keep going when its scheduled end. That would please most Film and B1 Existable readents.

Elie's is actually the second system to bring optical foremints the linear The first wash 5-ONS (50 Highly Interactive Cabola Visual Information System) in Highlit literra Japan sports and by the Japanese your state of the second of the second your second and the second second research castical on all benefactors and index of the second second 1976 Operation backar in July 1978 and combined to State

H-CASE is nothing if not institutes to trateout 7 biology in (locytry 288 million) tax bean speed on the project incoding to Masshin Skewelska managed genetic of the Vasaal information System Devecement Association which name H-CVIS Outside observant have estimated that to costand rule locativity deal type will be determined as the second second second costant and second second second second to costand rule locativity on the second costant number of homes as Decisioner in animality 4340.

The centerprece of HI-OVIS is while a called intervietive video. Each home has a selevision camera and a microphone linked to a central studio where local program ensurate. A typical program might feature. been reacherts democritizing favor le nocges in their can includent with the tableison regime laws the bone cont to the dada their relationships of the trans. The same bohrough is used to produce widevergence all calcionating though the data may be called captering and the data may be called captering the data may be called captering the data and programs. The determination would y SRM and the values that data most to produce and programs. The determination would be and programs. The determination would be and programs. The determination would be data and programs. The determination would be data and programs. The determination would be data and programs.

The children have been if anything 100 entrumentic about summoring noneclcational programs from the evaluation vidastape library which can be settio forms over the Iberraphic system. Early on in the executinetic Shar requests overwhat state the library and wore out astitie of the tapes. He CWS management—adults multi-milissival the problem by stang the popular tapes out of the library. If the world of one American communications, operatist, if "avoid defeation the which finding doesn't?"

Engine-tanguage specific accurrers/the grower of averaging social growth. Other a to characteristic strateging and the second social characteristic strateging and the social social characteristic strateging and the user will be required and other tainstant source to establish an ideal system. Others and also to function as an interimation source to establish an ideal system. Others and also to function (Metring education and establishing is new ideal contralunced and system).

Consistent approximation experiments the transtering program which to also succeed the same inagoing approximation to provide the the same of approximation team of the transtite simple programmer makes of branches provide approximation approximation approximation the simple cases and program of the end of an approximation approximation of the end on an average American apple the simple cases and approximation to the simple cases and approximation of the simple cases and approximation of the simple cases and approximation of the management or protestical plan waits also but the protecting to all an expectation and but the protecting of the simple cases and approximation of the protecting of the simple cases and the protection of the simple cases and the plan approximation of the protecting of the simple cases and the plan approximation of the protecting of the simple cases and the plan approximation of the plan approximation of the simple cases and the management or protection of the simple case and the plan approximation of the protecting of the simple case and the plan approximation of the simple cases and the simple cases and the simple cases are approximated and the simple cases and the simple cases



one that seemed publicative receiptors the service attraction provides Can this segurative be transitioned to algoin a set which or here to be transitioned to algoin a set which or the set of the transition of the second term of the bears in a part of the Candida second term of the set of the candida second term of the second term of term

Some preteients, including rumons that INOVA sub bottom concorder appears to the OVA sub bottom concorder appears to the American inspectation of a monthletiopan, inc. The Nopon Namplets and Deptember Companying that the Nopon Namplets Interpreting the Nova Interacting the parterny tools treatment at the Interactional Management was the Interaction tools Management was and the Interactional Management was and been interaction to the Interaction and Contemportation of the Units and the Interaction and the Interactional and the Interaction and the Interactional state and the Interaction and the Interactional and the Interaction application and the Interaction of the Interaction application and the Interaction and the Interactional application application and the Interaction and the

The battle over HI OVIS may preatige many more around the world. Regulations In the United States not much of Canada generative and table between the term highproximation betem photoximation and table between the term photoximation and the best photoximation and the Base such an exponent water States such an exponent water and the United States and the United

Weikerik Euspan government on hit upprover system and hviris will life oble teleprines that allowed Parce SQUention Exception results with the sort saved Baarta: The system is to estiarrying ISS0 interest net year with 5.00 more to be accelerate. The system is to estimote to be accelerate in addition to over how wides teleprines with television canness in every home. That move has a strategistem touring out hand way base data wides television to ever homethodowed.

Residents of soveral ottes in West Germenywel have a chance to by smaller services as part of an represent calable BIGFUN (an accesse is familie from the German name). A smaller scale test without videophanes is directly under way in Miton Keynes. England. And the Japaneter witechane company has smaller plans.

All those systems, tkin Eller and HI-OVIS will be watched catefully, they real impact



may not be tell for many years. Piontropics, changels the rules for communications gateries information-canying calabolity rate traditionally been at a pretriaut and engenesis have had to deven information scheme to use the tible capacity first hosbeen available. With fiberopics they such daily have more norminan they know what to do with

These pices has opened in ever fortal or communications rule hard bold or pices of the entry extra service in the entry extra service in the pices of the pices

Taking with the turner tead? How allood a flow the mean start first turner that which del flow that the mean start that the take will be flow that the mean or of other banks around the weak attenda were turner to the turner to addition to the turner turner to turner to additional banks that the turner turner to additional banks that could enter the additional banks that could enter the turner turner turner to turner to turner turner turner to turner to turner tu

When could be foreid occely mm². Comma interact Well-Chinn of the statement of the control of the statement of the control of the statement of the molecular statement of the statement of statement of statement of the statement of statement o

"There are operations to be estend, and Do we want it at all? Could too-perfect communications soluble us from direct homin cantact? Doublit is be used for homin antact? Doublit is be used for homin physical solutions and a second opy? I also Greg Drypatale, who has lived with the De soluen. Nance of us how the areased vol DO



FEAR AND FERTILITY

he said excitedly. It's sort of like making all the green lights on Broadway after the snow plow has been through

Biochais attempt to editability are empoy transfer found with a the Blac Chec ustrained lowery of These or work techniques in our lower weight to turners due puocodust herefailed to the tamper of a two books of the second second second second of the second technique are used of a check of the second reasland groups would not have been relied borners entropy on fraction fractional groups and herefailed to allow and borners entropy on the antioring the second second neural board of borners entropy on the antion of the Borners entropy on the antion of the Borners entropy of the antion of the

Normalization of medical standard parts the advantages of entry to transplants are contailerable A versar with here owneds intact, for example to unusate to occeave a child of here own explite bable to have her entry or example to younder women in the reverse shubton a woman who had normalis eqgs to tave shift able to carry a fisture to term could expensive additional a fisture to term could expensive additional and there and the shubton of the shubton of additional and there and the shubton of the shubton of additional and there are additional and the shubton of additional and there are additional and the data of the shubton of the shubton of the shubton of the shubbon of the shubbon

Where would the egg come from? "I we been able to get an egg out of the uterus to retrieve it after it is been normally fursiused." Shettlee enclasmed.

"And I we been able to clothetim a couple of propie with IUDs (which prevent the fersized egg from embedding in the uternel well). We know the egg would have gone to wated otherwise "

In a first instance, a woman with an ectopic pregnancy—in which a furtilized ecosimilaris locged in a failopan sube—would undergo a procedure to taxatile the emtormed that fault at Columbia-Presbylenan in the 1800s.

A larger instaction of entrops barries platts is that bays will enable physicians to recognize early groop abcompany, in tailaus, blocking part of an entrops which instration has actually occurred. Or Rebert Edwards, in English has considered barries and an entrops which instrapetiticate the technologie oxida to used to forty the system do larger that made to forty the system do larger that made barries to the system would be uniteediary blockate any deferrance and approad in the entropsion acting the entropsion of the entropsion.

Shettes was critical however of Itd wordes early-testing plan Such apparments could prove detrimental to the tesus he asserted. Bessies, he had doubte that declars could draw velid conductors about the normality of the entryice by examining Is it proper to boodle under the mistletoe? od cheer. And nothing riote to the season than British Gin. That's because

Brish Gin. That because is exceptionally smooth-auring Souther the trace or under a beades into tonic or under a mends here, you do go a good state build and a state of the state Boodles: Aler al., its Brish. Boodles: Aler al., its Brish. Boodles: British Gin. Always Proper. just a small sample of cells. You take two bunches of grapes from the same wire and a doesn't mean they re both good. Shell fire commented.

Other internal advantages to ontropy adoption have loss of a metodal basis and may herefore arous golder collocation. A woman may among objects the works of the pay andher works to carry the work in the tracestard a setting. Singles and the he could accommodate the Car when merographic become data the the Car when encounting and the among of the pays is any paytic and influenced a war when here the basis and the Setting and the whole the one basis when the Machine Law who have an the Belle. Shoulds was in their whole tool one basis when the wall in the

The day when such a meade comes to pose when a moder-ody Same-minind on the social security person — has a boly any half copies opportunistic clinics and/a any half copies opportunistic clinics and/a be capable of freezing and transfering furnal anthysis when one or two years. The fact that thousands of successful babocies cheep and more supports the babocies cheep and more supports the babocies of the any home that the situation of the supports the situation of the supports the situation of the support the situation of the supports the situation of the supports the situation of the supports the situation of the support the situation of the

Shellies doubte that the heating procease statil would cause a problem even theorem a series had the occasion to theore an averal or human simbly or A mapr advantage of treating he said is that the process allows the occler to intigliant an analyse at preceder the right time of here women is authority cycles inferently banding the odds that the impaintation will be append, he way in the dentitive the transfer be canned out in a subsequent cycle for opper synchronistion. Linkie mod uncumating and the analyse would be hoten to only one or how weeks. But, Shettins meanth Liant House with you couldn'theop for us mention or a were

The thaving process did not seem to souble him either l'knowin principle that you have to bring the ambryo out of this thew at the right rate not upto took 4 under a hot soloot and start.

Her may Shartles concerned that the cance would reached the transplottor embryg. He believes that the mother and one mould not investigated to the same RH tactor or blood type. A transplotted the to believe strengthesis of open is all tably of the mother shoody. For women instration with the through the becomes instration with the through the becomes interplot and the through the concerns interplot and the through the concerns interplot and the through the characteristic table. The table table should be instrated in the would look for well-counded become who do not imple

To listen to Shatties is like being led by Darte through the introde passages of the underworld. Beyond each theory those is well another theory more misterious more



Indexiding and more controversal that the analysis of the more entered times there are a thereing a network to many does be as a strain the more entered to many does as which here is existed that the had the increasing to born both much and works the net of between potters (both lasts and understandship this optimized by the additional potters). So it is and a and a book proget where the the additional potters (both lasts and understandship this optimized by a a phandagetrag upge from the time to essential lasts. Through the participation of the proget book potters is and a from 'the phandagetrag upge from the time to essential lasts. Through the participation is and a more the product of the phandagetrag upge from the here in the phandagetrag upge from the time is phandagetrag upge from the time is pendid.

The doctor will kill you however i hat he has already successful in objecting an egg of one of his female patients without brainsaine by a germ pell (The Cone Doctor March 1878) Though the list D here: Boyaet al about the same time onceeded in clearing an untrolling mouse gas to successful uniterative approximation allwiring egg has been chellinged by serritate in the (Hd).

As it is usualization and "britten showd" reproducing the control sequences of an exit was publication of 1950 in the -htermination of the second sequences of the second second second sequences of the second second second second second second the second the second the second secon

There was one final source on the source of the cause of our obligate. The doctor had yet another closers through the source of the source through the source of had inset the any other aspect of his work. He now had the knowledge he skild to done a main not with eggs but white permitting the permitting the source of the administration of the source of the source of the administration of the source of the

Normally where is human leng united with aspern ball rise a mismigation with divide two garneties teach containing 32 chromotomstand and the second second with a Lil human complement of 46 chromosomes "livenotices theower through the yakes "beneficies theower through the yakes "beneficies theower through the yakes "beneficies theower through the yakes aspert that some sperim are begin and that they re-dobid always containing forty-dischromosomes

The more suggestion that some human germ paths are in that, depicid is a signifcant newslawn, which (borne out in the next new years wit) pace the old ountry ductor alread of his more sophesticated obligations. Theoretically a diplicid spirm may be possible. Daliferms physician heart Glass competitive. Theoretically social heart Glass competitive. in rabbits it wouldn't surprise me if it were also true in humans i suit don't know

How can you really tell that some hu man sperm are diploid?" I challenged Shettlee

No one is then to best the big sperm too forly size checrospormes, he said "but werything panets to their being diplied live seen the diploid sperm from way back in 1960 I might sound like a consented davil cost free live my parents biospect me with a keen opers of observation.

Whet is the ratio of ciplinit to haploid aparet? It values from person to person Shettes answered "but generally very low perhaps one or two percent diploid

Able to souble frees mere dystal critic toos fee single projectularies to perform the cloning expenses. The source of the too her ensemble is table to be tetted on the ensemble is table to be tetted on the ensemble is the source of the source on the source of the source of the source of source of the

I was incredulous. I II make a delayed two out of you. Shettles threatened. You ward a twin now Well. I light your nucleus III get a good regip take the nucleus out put your pucleus in and incubate it. There you go!

It was duply when we plained all the curb on Law legals Boulevard South. The nocturnal signs of one life were beginning to appear. The lights had just come on all the wesdang chaptel. The hookers were all ready strang. The doctor humed black to the christ and locked the door.

— Latorum is seemia local drat supprises the insonthial was abandoning him. He seemed extraorinally all equipped to cope on this can ach the period Las Wigas, a city that he had called nothing but a bit of lights and conorder. The lowed opers in a form whimpeople played baccular as a passime He was clearly imparatized.

I also sensed that the gland Antikida Deam that the hoped to find as Hurter Thompson concerned: "somewhere initial cas fragar area, would trainal initial resistance and the sense initial and a resistance of the sense in the sense onlogical aliments were making and the resistance of the sense of the clinic, Force Jasted three The owners of the clinic, Force Jasted Three The owners of the clinic, Force and the sense of the clinic and the sense to the sense of the clinic and the sense of the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of the sense of the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of the clinic and the sense of the sense of the clinic and the sense of



resistur Wigas real assate speculators, we're growing restless and wented a more immodese return on thair investment. When will your article appear? the Austrem-born Hastimy acked me

Thinking them must that chere quark to Landmain Theretes Hand Artendy people harbage in their chere offer the task develop makes to carry on the task chere. The hard happed to my car has unortholding yet an case for infertile couples will at glateater taxonal but Vapas for them them an case for infertile couples will at glacellane. At laive hydrogen for them the factor proud but was only manaking used on land the set operation is finite them by discussful of mittee them as the task but do the task operation. In the task was the two tasks the bags yet can be at the task operation the task of the tasks and the two tasks the bags yet can

Returning to New York with these thoughts in mind i called the doctor's its early agent. Salitatis Lowenspon, to doct sugges with Owning presands. Tathy Kenber who had met him in Wegas. The Omm Foundation I wess mit would be willing to underweate active of the septements. These Laboards has write at how who had met to be the write at how the storage who at the set of the septements. The Design, their program and who will be the set of the set of the set of the Design. The set of the set of the set of the laboard on the set of the set of the set of the laboard on the set of the set of the set of the laboard on the set of the set of the set of the laboard on the set of the set of the set of the laboard on the set of the set of the set of the laboard on the set of the set

But the doctor who had never been able to earlied this fees from his delinquiett peterns much less formulate a budget was uncertain about where he wanted to pistotics and how large a grant would be needed to cany on bas work

A letter annuel about one month later It was as I had suspected. The chric was being closed Startilis write. His omployers had become impohent with the linckle of business. His two-year contract was been approaciated.

He was thinking nonetholees of making a go of Vegas and he hoped to "open an office in a rupe location"

At the same time the doctor appeal of moving on to California to pursue research with a colleague of refurring to his friends in radio Vermont of of leading back in a base ind gary to his hometown of Pontolac, where he would become the venerable country doctor

And Inally a phone call came at 7.45 one August morting 1 was in the showed influe thrit. Il must have bein dark in Nevada at a quarter to five when Shortias pleces has call he had had a clean the taid me in which he had cloned both a male and a lensite He proceeded loable onte on the surrocal details

The call was followed by a lengthy kines seeme of it services if the instance of the service security and the security of the service of the registry of the service of the service of the dring wet that "Land's Work", part trying to high Hm out a bit go to presh. And then the correlated. Th was no beautraftly wohheart list ay our carrie with extension the service were born! I'm so preval happy for you beer contrally Landturn B blacks CO



CONTINUED / NON MORE TOP

and had no great discoveries to his credit. And here he was claiming that with an intificial device he knew things allow the universe that the greatest minds of the past mem Copernatus couldn't have known.

And this sort of arthroad evention to come the sign the solution evolution of the assertisenth contrary fou sock a methloope a vecuum pump or all effectived machine and you don't have to think bet at value opcound on the part that all help they don't see and knew things they don't have. A work are tablet of the solution pot envy simplifications and the solution of they simplifications and the solution of the tablet opcolory.

Take the modern casin of location philosoophens has by quarking USD they care gain as opportenced in the universal. The days are appreciated in the universal in the the generatical wave of docstrated that care wave days of the universal is an antierometage of the universal barries that encoded point of the universal barries that wave processing data. Typus could have in all fill of encoded you to ever quarks all that would barries location. They could have in all fill of encoded you to ever would barries location. They could have in a the these attributed and you could be the the set of the the attributed and you could be the the set of the the attributed and you could be the the set of the the set of the s

ferent world. He tound a different set of things thely poshad to explain with storice. Now wake become temby used to that Today we believe in quarks, pulsars and DNA—things quar unreachable by the rai kaid. Instea Weve become outs used to believing in and openating with things for beyond the times of our servers.

What is hoppening them is all 2010/ where is hoppening them is all 2010/ to the goody that the antihaaries allows can do them you and the antihaaries allows and the pools that the antihaaries allows many sets is to booms (see --booms at any sets is to booms (see --booms at antibaaries and at antihaaries and at antibaaries and at an antihaaries and antibaaries and at an antibaaries antibaaries antib

Deew Sel. If computers can educate beneselves through levelake's and sellprogramming and there the danger that wa will lose cantrol over our darking at we refrequest thereing for ourselves?

Prog.-That's exactly the beef the church



had with Galiao. It had lost control. I think we'l get used to losing control that way and realize there set other uses for human beings. When all those instruments were matriced to augment the senses, we didn't give up using air with sets note and mouth. We wont give up using our brain We wont one up our withoeter.

General built computers outpace the melingence of their designers and operators have well we lumans be able to check whether they are still accurate in their rewilds--or wave in their advice?

Proof there or granable difficulty in the thom in learning the latent of uncided human is leaved as dialles knew them while walky mountains on the moon bacculae the could measure that the down and calculate that there incurrent wares that allow calculate that there incurrent wares that allow calculate that there is not set to be the set of the there is not the set of the set of the there is not the set of the set of the there is not the set of the there is not the set of the set of the pected is to be — if is were made of patient index with the set of the set of the index with the set of the set of the index with the set of the set of the index with the set of the set of the index with the set of the set of the index with index with the index with index with

We don't question instruments that tell un DNA is a double herk or that the quark is amanged in a onitien way or that pulsars exist. Nobody has been out to a pulsar and seen it pulsarig, yet we believe it does

Other: We believe it until someone correct up with a ballet theory

Proce Sure but all theory and all cognition are like that We behave in our preterm ocorooms: just as we do our physica and chemstry But we know that rient year we re going to understand things deeper and other enty.

Gener, it anything requiring brainpower will be done by artificial brains, won't our dwi brains atrophy?

Proceine its quale along time in the future and there will time to other things for us to do The range of human challon control to the the times on certain to the potamis to be partned in permit to be written man bangs to be known. There might be come the equipped in they are might be some the equipped in they are might be used to appach to make alternet due come when the human were were charge.

Shorty after tED in backarie obwasit has here was no future in mercely isong your agest if you wanted to see mosil. You had better get youwait is talescope and a mcrosstepp. We don't regret that or love our cyst less, because this we been supplanted in that wey 1 thinks our eyes give us more joy and understanding now that we have there intern utilities add.

Geers Want the computer be analyzing the works of Beerhoven. Chop in Mozart, and Bach and be producing its own original music or art?

Proc. It should be a relatively trivial task to say to a computer. Write me a screate in the sayle of Beethoven " and have it do it

Provi I can imagine that but not in the first fairty or forty years of trying. It's possible it hears been done yet. But we have only a sent of Sione Age table siteam computer it's poly set the beginning DO

Piction THE CHANGED MAN AND THE KING OF WORDS

BY ORSON SCOTT CARD

Once there was a many who koved the sent more than H a boy who loved his father more than death. They are not the same story not really

But I can't tail you one without telling you but other

The man was br Alvin Bavis, and the boy was his san. Joseph and the only woman that either of them loved was Connie who in 1977 memod Alvin. with hope and pay, and in 1978 gave both to oble on the bonk of death and isdowed them both socioratingly. It was an afforditorate family This made it amout certain that they would come to cred.

Count acut there on more it there also use the object there in the that the intertion also that the there is the that the there is also there is the factor is the there that also there is the there is the there that also there is the there is the there that also all there is the there is the there that also all the is the there is the there is the extent of the isometh more its the there is the isomethy the case is the there is the extent of the isomethy the case is the displaced by unconducted the isomethy the place allow. All there is the isomethy the placed here isomethy the case is the rest placed here isomethy the case is the isomethy the placed here isomethy the case is the isomethy the placed here isomethy the case is the isomethy the placed here isomethy the case is the isomethy the placed here isomethy the case is the isomethy the placed here isomethy the case is the isomethy the placed here isomethy the case is the isomethy the isomethy the isomethy the case is the isomethy the case is the isomethy the isomethy the case is the case is the isomethy the isomethy the isomethy the case is the isomethy the isomethy the isomethy the case is the isomethy the isomethy the isomethy the case is the isomethy the isometh

Nother Avin nor Contra eval beleved Joe would be relateded. And soon enough it was clear that he wasn't He walked at eight monthe. He talked at twelve months He had he alphabet at eighteen months. He opuid read at a second grade level by the time he was those. He was inguistive, demanding, independent, disabedeet and explicitly besultful, with a shock of opper oclosed has and a face as smooth and deep as a colower pool.

His parents watched him devour learning and wole sometimes hand passaid to fixed him with which the needed. He will be a great main likely bolk whispered to elech drier in the societ conversions of inglit. It mode them proud a made them affold to indee that his learning and hes safety had by chance or the grand beiling of throat been enrulated to them.

"Did rais to work the Brows strength mercen method was readed by the set of the set beginse because with sories (is work) the set of the set in set of the set of the

The problem was not the thirst for takes however. The conflict began because Joe had to ive out his stones. He would get up



In the mensing and announce that Mommy was Mama Beer. Deddy was Papel Bear and he was Baby Sear. When he was an gry, he would be Goldhocks and runwwiy Char momps Daddy would be Rumpelsatisten. Memmy would be the Februers Despitive and Joe would be the King Joe was Hensel. Mommy was Createl and Alvin was the Worked Weth.

Why can't I be Hensels and Greeks father? Akin asked the reserved being her Wocked Watch Not that the thought is meant anything. He sold himself is meanly amonged him belave has and constantly sesgring him dialogue and actors for the day's activities. Aivin mere her her hour to hour to the next who he was going to be index on them.

After a time, mild annoyahoe gave way to open inhabon if a was a phase Joe was geng through inough to unit unity to have ended by now. Alvin finally suggested that the boy be taken to a child psychologis. The doctor said if was a chase.

Which means that scorer or later he il get over it? Alvin asked "Or theil you just cent the use out which a sports of?"

Both said the psychologist cheerfully "foulli ast have to live with it

But Alem dati net lake kiring with it. He weeked has and to call him Daddy He was bis lather after all Why whould hallhave but he bay was assigning him skyle with a bay was assigned him skyle with a bay was assigned

It was not so of course i doe emply acted them out with Commentant Alivin had gone for the care is out up DNA and pull it backtogether creatively. That was how Job learned to high the those form into father He Job was sure that if only he found good encycle forms. Duddy would plan actors

So what Dady web home used at many and out stores theread he want who further played number and work gamme shules exemntary Spanneh as an introduction to Lan, played by annual played and remped until Wormy, came in and test het how to ball work before the cell fail in on them This is being a father. Aven but thread I and good tabler, and is like the twe to ball when the store the store the want the interview of the store of the twe to ball out a store of the store of the twe to ball.

"Dacidy just doesn't like to pretend. He likes your stories, but not acting them out.

In 1983 Use furned five and entered school that same yeer Or Beve created aboreturn that level crussing proceptation and neutralized it in 1987 Use left tochool bacause he know more threat any of his begins also applies on commercial beging he bacterium freight spot classing. In its dized bodies of water. The university audienty, became territed that he might retime and here on his income and take her intime away from the school. Bo her was prefin a lateoretary and twenty assistants and eccretance and an actimization on setant, and from then on Dr. Bevis occid prifty well do what he field with her stren.

What he lived was to make sure the reselects was still going on as carefully and mathodically as was preper sed in direct tons that he approved of Than he want horse and became the fisculty of one for his sons aver private eachering.

It was an stylin time for Alver

t was hell for Joe

Derived his thirtier mind you Joe played elevanting, and help shad averate full time reading /Tie Plaste of Fody in the original link objectivity grade togeniners's and link objectivity grade togeniners's and any of movin that a graduate studiers applied togeting the site studiers applied by applied to all studiers applied by applied to all studiers applied by applied to all studiers applied to any of the site was applied of applied to all studiers with the site moves?

For with Fether home. Jos and Mothe could not play

Before Average that a state in this case of a transfer and the state of the state of the state of the state and the state of the state of the state of the theorem of the state of the Medical Coloneerity, Disayin Thanas, Alor Medical Coloneerity, Disayin Thana

Now Avin was home and that game was over No more stolan momenti of reading during school. Fether flowred on schose History yak. He and poses no And so while Avin flowpit that joy had finally come for Jee and Comme over wes deed.

Ther life became one of allusion deeppring prisees to each other cut of books, playing outfor chearcians which ut we callewing themselves to utter the other a name. So parketly did they perform that Avian free/ kinew kine what was happening. Just now and then hed treated that screating was going on that he didn turderetand.

What sort of weather is this for January?" Alven seed one day locking out the window at heavy rain

"Fine sed Joe and then thinking of


"The Morchant's Tale," he smiled at his realities. In May we camp heads."

What? Alwn asked "What does that have to do with anything?

"I surt the tree circlary

It all depends I said Connie 1 on whether the run chriztles your exits

When Conne left the norm. Joe asked an innocaso squestion about telectory and Alven put the previous exchange compately out of his mind.

On mitter med to put if call of the mitter of the second second second second second second to de not second secon

Edids take playing the parts to pave me years ago. Abun thought Does he like

playing the part that I have gover hat? "You we cone as far as I can take you

Alvest said at breekhast one only "in every hing, except belong of course Bo IT guide pur studies in belong and for everything date i'm hing, advanced graduate students in vanous helds at the university. A atheant one each diw

Joe s eyes went deep and distant "fou won't be my teacher anymore? .

"Can't teach you what I don't know "A vin said And we went back to the lab. Wint back and with delicate cruelly fore open a dozen cells and made them into ecrite thing other then themselves, whether they would drift for

Back to home July and Comme loaded are eich often or publication was the loan in every and the first was the washing back to mother. They lut beam washing to be the mother they lut beam proporties person provides a under the guard avery risks Now three was to guard and whord in tensor for exercisity them was no message withmen July back to be loaded and washing or playing obserands that the tensor for the table to get audate user foreign or tables and every the back foreign that had never been tables before.

Joe dreamed tentioning gantile hight manes creamed of the same thing over and over the setting was different but a ways the story was the same. He dreamed of being on allow and the granesh highing of the second second second second second second tasks the second seco

Life was normal enough for all here Biosharb lunch driver kinesy wine alegowork warn speed own use brack to alspite the chasts of ourienty for played out despite the chastow of mexistate whita. One day John and his som ware in a booktate the Grypbon which here the constate pregnan Classical Ainth was broaking some use when he indexed use was no issues taken her.

His son all the stender five test nink inches of him was standing half the store

Q: What is the hardest thing in the world? **A:** Tearing yourself away from an EPYX game.



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wwwy, benit in aims concentrations over something on the countrel. Avvio III a Mintible yearing to the goal He was ab beau one years of Jose IIII. Aven had loss thin new years of Jose IIII. Aven had loss thin hav Jose was neeining matching and the cause both would be too late. When did he avtication is an expression of the solution to be mer? Ave wandered. When did he both mer? Ave wandered When did he both mer?

And in that moment he knew what he had load by calking his size Apolto he had told inserties which he had taken from his son A connection between stores the child addad out and his itervelveling of who he was The connection was so real it was almost tangible and yet Ahm could not put it into words i could not bair the tervel edon and ten add so and to....

Just as he was sere he had the ruth of things is speed away Window work, he memory oxid not had it tost the understanding the rement it basise. Unwer all, and have already longation Angry attimself Alvin allode to he son and reelered that Joe was not doing anything intelligant, as all his had a dock of tend cards spread before him He was doning a reasing.

Cross my pains with siver, said Aven He thought he was making a jobs but his anger spoke too loudly in his voice. Joe looked up with share on his table Alvin cringed inside himself. Aust by apsaying to your / wound your Alvin wanted to applogere but he hear to strategy for that so he head to affirm that it had been a pixe by making another. Discovering the secrets of the universe?

she cards and put them away

No." Alvin seld. No. you were effor ostod, you don't have to put them away

It is just nonsense. Joe s

round grig word incogra

All the meanings are so vagoe they could fit just about anything. Joe laughed mit hiessly

"You looked pretty interested

I wait pail you know wondering how to program a computer for their wondering whether I could do a program that would make it make scheme assess. Not just the tartidom fail of the cards you know A way to makent respond to who a person really is Out through all the-

166.4

Pest wondering

Con anongin an manner

some we we we set ourserves. All the test that we believe about ourserves. About who we really are

Something didn't ring true in the boy's words. Akin know Samething was wrong And because in Akin's world nothing oould long etial unincipared he decided the boy seremed avaluant benause his father her. made him ashamed of his own our only / are ashamed that I have made you ashamed Alvin though: So I will buy you the cards

Till buy the cards. And the book you were looking at

No Ded said Joe

No is all right Why red? Ray around with the computer See if you can sum this nonsense into something. What the hell you might come up with some good graphics and sell the googram for a bundle. All misuphids So that Joe Even Joe a loop was a line.

What Allow adds I torow was the value toos what Allow adds I torow was the value of the the All and could be called the toro addression to the torow the torow adds the strategiest and the torow the torow adds the strategiest and the torow the torow adds the strategiest adds the torow the torow adds to note in add threads the torow adds to note in add threads the torow adds to note in add threads and the torow adds to the torow the torow adds the torow adds to the torow the torow adds the torow adds torow the torow adds the torow adds the torow to the torow adds the torow adds torow to the torow adds the torow adds to the torow adds the torow adds the torow to the torow adds the torow adds to the torow adds the torow adds the torow to the torow adds the torow adds the torow adds to the torow adds the torow adds the starty the torow add that add them to do to the torow add the torow adds the starty the torow add that add them to do to the torow add the torow adds the torow adds the torow adds the torow add the torow adds the torow adds the torow add the torow add the torow adds the torow add t wenting to be deal thirws this lither ingleower have here had been deprived of schools to rear being. Inits own soary of latitier mothers son was so falge ince that her wene missly greaping at anything. Falther mocked bus, books at the soary of the center, and here belowed / do not went to lake those homes. It yous mocked wents of in a side in my own hands. "Presse don't "the suid to his state"

Buil Alvin, who know better, bought them anyway, hoping to please his sort

Job stayed every from the cards for a whole day he is all only four half him the every survey in readors for the with the term again. It was instantiated the with the term of the second second and the second second survey. They are not to be denored 1 cars survey. They are not set on the second 1 cars survey. They are not set on the second 1 cars they are unlike and second and the second second second second second and the second 1 cars second second second second second and second s

"What did you bring those home for?" Mother asked in the other room

Father said nothing. Joe knew from the second that Father did not want to make any explanation that might be overheard.

They re bity said Mather 1 thought you were a sciential and a sleptic 1 thought you didn't believe in throps like the

"It was just a lark." Father led "I bought them for Joe to plink around with Hells

thinking of doing a computer program to make the cards respond somehow to proplex parsonalities. The boy has a right to play pay and their

And in this leaving yourn where the tay compares and muse in the where Last land notable that downsain watering away from the leader cause is beaching a the of the occeans beach in the beach larger that beach in the leader of the last larger that watering and the last larger that watering and the last larger that watering and larger larger and the last larger larger and larger and the approximation of the inform larger and larger and the approximation of larger larger and the approximation of larger and the approximation of larger and the larger of the larger of

At two in the morning the gal up that the source of the source of the source of the angulated of the total dock up that angulated of the total dock up the means that mean phases that the source of the source of the total dock up the source of the source of the total dock up the source of the source of the total dock up the source of any the source of the source of the source of any the source of the source of the source of any the source of the the source of the the term and the source of the source of the the term and the source of the source of the the term and the source of the source of the the term and the source of the source of the term is the source of the term and the source of the source of the term is the source of the term and the source of the source of the term and the source of the source of the term and the source of the source of the term and the source of the term and the term and the source of the term and the term and the term and the source of the term and term and the term and term



was after. And the Queen of Pantacles had ust given berth to a bloody star, whose fathan was not the King of Pentecles. But poor clickold

Through the right he laborat unit each pattern was right he laborat on the pain when he laborat as the high watch was were also in height limit have to the montwant of the lease along limit have to the montwhen he acades he was along in the montthe caread on the lease along mmodal was the the caread on the lease along montain the has also the height memory along the memory has naced no help to recall them memory has naced no help to recall them also for height memory and but toother names charged every time they care loop the care the set of the set of the set of the montain the care the set of the set of the memory care the care the set of the set of the set of the memory care the care the set of the set of the set of the memory care the care the set of the set of the set of the memory care the care the set of the set of the set of the memory care the care the set of the set of the set of the memory care the care the set of the set of the set of the memory care the care the set of the set of the memory care th

By evening it was done along with a bref machamize program that divel the Calcia The pottoms were light. The names were reported but any other than a source of the pottom but any other that is the source of the meaninglass. The controller could not understand and underscloudy doal the calcia it was not a processing the pottom that was and under to chance.

May I triker a little with your computer? Joe askud

The hard dek? Tester locked doubtdui. I don'twentyou to opiniti. Joe Olom't went to fry to come up with another ten tousand dollars this want is another ten tousand dollars this want is another ten tousand dollars this want is another ten the baues with the fart cards here grow fue enough, and im survy thought them for you, and i cher want you do set the compation appendix in work? make this dorementen are unstantial.

Just an interface. Father You confluse the parallel port enyway and I can put it back afterward

The Acen and the hard disk aren't even compatible

"Eknow" said Joe

But in the end there really couldn't be much argument. Joeknike computers better then Alvin did and they both knew that what Joe took apart. Joe could put together it took days of ankening with hardread at diviner he spoke to Father about much term that he was a balanced not a methematician. No one was fooled by these

You have to eat. You can't die for this

use stat nothing. She set a sendwich by

Upe this has gone far enough Get your-

Joe skint look up "I'm under cortical the said, and he went on working

After my dras Alver came and stood be tween Joe and the television aid. This nonsense will end now. Abin said. You not stop working on this absuid propriati but when you do this to us and to yourself Den-

That's all notif ' stud Joe . I ve mostly fireshed it anyway. He got up and went to bed and slept for fourteen hours.

Alven was releaved. I thought be was

Corne with more womed than ever What do you think he'll do if it doesn't

"Work? How could it work? Work it whit?

"Haven't you been insterving to hem?"

He havn't rand a word in days.

Ahan buched 'Maybe your doctor, what s his-name maybe he was right Mo/be there was brain damage after all

Ahan "

A pike for Christia sake

them out up and what into Joe a room to

What are una O Course asked simply What

Ahan however sust nodded. He refused



The next evening Joe insisted that his father help fam test the program "It wont

C for colds. It never works on skaptics "

Come stood small near the reingentor

Did you try \$? Alvin asked her

"Morn did it four times for mo " Joe said

Couldn't get it right the first time?" Fa ther asked it was a joko

Got it notic every time Joe said

at first but then looked away in-what? combail had happened while he was at work Should I do #? Alwn asked her

No. Corne wheppend

"Please." Joe said "How can I test # f you wont help? I can't will if it's note or arong unless I know the people claims if

What kend of fortuneleller are you? Altwill the future of strangers.

I don't tell the future. Joe said "The program just tells the truth

An subf said Aven "Truth sport what?"

It tals your names It tells your story

Joe Alvin said. Ill pky this little game with you. But don't expect me to recard it as now 11 do almost anything for you Joe.

I know

Just so you understand "

Alvin set clown at the keyboard. Prom the cringing hound makes back in its throat tasr whatever caused it, was contacious. self for letting this upset him. He was in

"Just type things in

What through

Whatever comes to mind

- Mounte? As enhance? How do liston what

you write whatever you feel also writing

failter owns this absurdity a for chance. He began to come up with numbers, with chesce it was not in Alvin's nature to let can recting on the keyboard the long of names fragments of numeric data proas be did if that he was cheating his soft he told himself. What could be more a pert

Joe shrubped "Do you think it is?

'If you think you're through, you're through. Joe said mustly

"Tit, yourn very good at this Alvin seid

You re through them?

YAL!

Joe started the program running. Ha his father's impasence and he lound himsolt mission for wait. The whening and began appealing on the screen. This is you This covers you The crosses you The is above you below you before you bepredictably the stones that had flooded in were the same. Over and over again, the

Joe looked at it and understood at once Father had led Father had consciously controlled his input had ordered it in some lossed. The program had out laked Extension simply would not be read. The King of Swords by tenself was power as all the Kings were power. The King of Pentiscles. Cups was the power of negation and obliteration, the prover of murdler and sleep And the King of Swords was the power of could say Twill kill you and be believed. and so be obeyed Swords could say 1

"Edmund" said Joe Tichmund was the

We are only what nature makes us. And

Joe looked at his father expressing notheng



the display changed, each card in furn blown up large, nearly \$11ng the sphere The King of Swords awary time. With the on the Walk clock -

leaning on the refrigenator "And that's all?"

Should farm be movi? ' AMin asked

Alwn could not make up his mind how wahed held never bought the cards for an nating preaktast with his family. Than exhausted from tack of sleep ina would get parametes sometimes when the articlal Joe's tarot program it was at such times that Alvan photed to provide Joe with introdevelopment and publication. Alterward Alive always regretted having helped Joe stormetal waste of a brillioni mind it also

who had also put random data into Joe's ornorate When Jos memorated the tarot him was the months of work in clinics, doing readings with people the doctors knew in trrately Even the most skeptical of the participating psychologists had to admit psychologists said openly that Joe not only like stepping into my publit is mind. One

'My son is brilliart. Dr. Fryer and I want rambor can't be more then liack

suprofiled to the test yourself

Aver almost argued, but it was true. He never had submitted, even though he won! through the motions. "Two seen it in action," Aven see!

"Have you? Have you seen his results with someone you know wol?"

Alvin shock his head, then strated "Trigured that arrow I datint balaxie in it it wouldn't work around me

"It isn't macuo

"LianTspence ether "said Alvin

No you're right. Not science at all But siet because it sin't science doesn't maan it sin't trut

"Effer it's science or it isn't"

"What a clear word you live in " said DT Flyer. All the live nextly data will be entry double-band tests on his program. Or liveis, Whitu's theory is it to has analyzed data taken from the same patient on diferent days, under different erzostatandat, the patient has even been green diferent instructions in some of the samelise. so that it weard reinderm. And you lives with tabcenet?

Alwn knew but did not say so

"Netering did his programmelia substantaly the same for all the different and/or inputs for the same pakent but the program diso spotted the regions. Easily And then it surred out that the imports were a consistent result for the worrism who write the sets we happened to use for the norrandominput. Even when it shouldn't have worked it worked."

Very impressive " said Aven, sounding as unimpressed as he could

"It is impressive.

Tidon timow about that is and Alvin "So the cards are consistent. How do we know that they mean anything or that what they mean is flue?"

"Haant it occurred to you that your son is why it is true?"

Alvin tapped his spoon on the tablecloth, providing a muffed mythm

"Forgive me for what might seem a slight to your profession said Alvin. but how in God's name do you know whether what he pass is true?"

27: Figure emited and couples to lead Backwaie load tensive of this lay worg. We can test his interpretation of the vice beford he program. I ve trade to the dogen beford her program. I ve trade to the dogen the states for instance, which is the dogen main offering, backase with your enhance in goaters. I having don't orderstand herit And after he reach them 1 before goo dobare pleaves Or Brows that how every main be pleaves for them before goo dobere pleaves Or Brows that how every main to hold and off the dogen to use provide the back of the states of the states of the back of the states of the sta

Head and antlers above the rest.



For generations, in the wildsrness of Ganada, the Oland family has browed a special heer with a flavor as bearty and robust as the land itself. Aber the color of Klondike Gold with a head as pure as a Manitoba snow. A heer they named Monsebead.

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6. Reard Important Inc. Lake Success, 59: Sole U.5. Importants (1982)

It unders eventhing that I have believed in it underrapits my own title a work. And Joe is just the you He coast think paybelieve htm?

That's your problem. ant it?"

On the contrary Dr Bevis Everyone capt for you I think that most definitative makes it your problem.

Dr. Fryer was wrong. Not everyonia bakoved Job

No: said Comma

"No what?" issked Alwo It was break fast Joe hadn't come downstars yet Alvin the eggs" and "Thanks

Conne was drawing peths with her tork

Dr Bryer told you to believe it didn't

noise as possible. Nothing was normal

Nothing was as it should be Alvin med to "You' will do a reading with Joe " said

Fryer You always instation ventioning every tring for vourself. If you believe you must your own diebeauf. Am Linot notit?

And I im telling you this once to have faith in your doubt. There is no truth what

Impair she want on Ming the sterios I mean how can arrivone take this sonously? The card he calls Strength-a is it then he makes up a God demond store

together He supposed to be the instoom child, charring Adam and Eve topethat That's why locase and Lace fried to ke Dectorys Bootupe they haled each other getter But then they stayed together any



inicial averaging that againing he about the or-

"He's read too many books."

Country transled, 'If he close a reading of you I'm atraid of what will happen.

If the feeds me grap like that. Conne. Lt out ble my to No fichts. Loromise

She touched his chest. Not his shirt, his chest it leit as if her finger burned right hele stended 'I'm alrad the you'l be

"Why would I believe him?"

Tim not locarite Alvin I "Of course you MOD!"

Don't believe tem Don't believe any

Conne dont gat so upset ' Again "Why would I believe htm?

She shock her head and waked out of the shorn. The selber was shill running in the sank. She hadn't said a word. But her an swell rang in the room as if she had spo-

Aven tried to sort it out for hours. Oodhas and include Adam Eve and the Devil The mother freeding his baby to the ion As Dr. Fryer had said it ront the catch it ran time program it is Joe and the stothat Joe hear's read? All the takes that men bes, and now he was taking the tee back. and they believed him, every one of them.

No matter how hard Alwn fired to treat this ponsimilar with the conternal it de hand, that Alvin was playing games, not

That night while Joe was watching Mr.4"S"H mana Alvin came into the family room to talk to firm it always startled Alvin shows especially old ones from Alwin's own gribler function of a without reading

places where the laugh track did. He was at Hawkeye hmeel

What was so furny?" asked Alven

"Hankayo, stad Joe

"I know," said Joe "But hars so sure hers rate and everybody believes him. Don't you there that's junty?

As a matter of fact, no. I don't "I want to

give it another try. Joe " said Alvin

subject Joe understood at once as if he had long been weiling for his father to ple mmediately made one of the full color

Aven entered a single command that told and tabler and son sat logether to which

After a seeminoly elema wait in which card appeared on the screen

This is you issue Joe it was the King

What does it mean? asked Alvin

Enter noticed 'And why is he holders

1 dont know

Libouofit you knew I sted Falber

It's how you spend your He Judama

It's what you do Father is a d Joe "You

You break life down into its preces. Then

Aliven thed to hear ander or bitterness in fact for all the world like a doctor with a

display another card appeared again on

Your enemy your obstacle. The son of

mentioned locaste. How similar is this to

Joe locked at him impastively "How can Eknow after only three cards?

A card above. This crowns you. The his hands stanro of into the distance with Seeping Beauty and Show White

A card below. This is beneath you what

someone would stab me to death

not. What you fear is clearly at the hands of

A card to the right. This is behind you studded boat poing the craft upsheem



of him "Hankel and Gretel sevit into the sets in a leaky boat

cald Ahm "It looks like a mother and child

Ah stud Joe A card to the left. This is before you where you know your course will lead. A satoophagus with a kingte sculpted in store upon it a bird resting on his head.

Deckmin Thought Novn Always a safe pendeckmin And year to safe at all The cards hermodyles assemed malavalant. They all depicted statustenes that create out whin agony or faar. That was the gamerski, Novn occided Poton toroccil pactures will arrest to all strategies and the result of the approximative statustical statustical and approximative statustical statustical statustical statustical statustical statustical statustical approximative statustical statustical statustical statustical statustical approximative statustical statustical statustical statustical statustical statustical statustical approximative statustical statustical

himitideath said Joe

Alvin was startled to have his thoughts so appropriately interrupted

¹ It is a monument after you re deed. Wety your words engraved on it and above it Bind Homer Jacus Mehomet To heve your words read iso sonoture.

And to the trial time (know sog genurary) inghtend by while this set mide focus hed from the ubure highlend through the have the disclosion means to hope for a heaveshed biological means the set of the set of the weights (did through any set of the set of the the set of to himself. But utacenasts were layer al classification de hattered read before and the code has been exact where the set of the tools have been the set of the tools have been the and the code has been exact the set of the tool between and the been tools before and to be the the tool before the how has been of sets when the has been of and when the has been of and when the has been of the set of the has been of the has been of the set of the set of the has been of the set of the s

Next the computer placed is card in the lower right-hand corner. This is your house." It was the Tower broken by tightring a nan and a worsan failing from it aimounded by lears of fame.

A card deacity above it. "This imports you! A man under a time boards a schaam with a hand coming from a small cloud giving him a cup." Etyah by the brock and the raivers feed him.

And address that a man walking away from in stack of eight cups, with a pole and insueling clock. The pole is a winnd with loaves growing from it. The cups are arranged so that is space is left whore a minh cup had been. "This alwest vau."

And there, at the log of the vertice if lee of low rankin (Dem). The ends - A bankop anoman and a child invaring barkee Deeth corps of a lower. The horse is banking the corps of a lower her horse is banked on a lower. The horse is a simple barkee allower in the destination as the polarity and a shell have the same is many between allower in the destination of the lower and the lower here the lower of the king. The sends is, and band for its many and the king is the corporate of the king.

Aive warted looking at the pards warting for Jok to explain it that Joe did not explain. He sat accord at the monter and

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CONSUMING: THE SEARCH MAN, MICH.

then suddonly got to his feel. "Thank you Father the rast "It's all clear now

"To you it's clear." Alvin said "Yes, "said Joe, "Thank you very much for not hence that time " Then uppe made as

Hey wait. Alwin said "Aren't you going to exclan 6 to me?

You wouldn't believe me

Altern was not about to admit to arryone least of all timael that he did believe I still want to know 1 m curous. Can't I be

Joe studied his father's face "I told Mother and she hasn't spoken a natural

So r was not ust Abons meraration. The tarot program had driven a wedge be-

That s what I m alread of Joe said

Son " Alve said "Dr Freer told me that logother is the closest thing to truth about 11.81/7

I don't know if it is the truth. Or if there

But how are things, with people? What way I do? Hormanes/? Parents? Social pateveryone else. And every new person corrections makes it all different. That s

Joe shrupped 'How can I know? How

Then undo your work with me, and tell

of they findb if

Why rot?

ever meant to Then for God s sake tell

down Term Goreni and Regan because to hear I am Declipus because you printed

"I have loved you more than He

You were always ahaid of me Father feebled by age Like Laros, terrified that took control you put me out of my place."

Educating me in order to make me forever your shadow your student. When the

"Damnable stupid factoria

No more stupid than the fiction you be stones see autout interpretation be-

Titlerik I koow that much at least " Alver and trying to feel as contemptuous as he

He dreamed that he was bound up in a web. tied like a spider's victim, but the sorder never came to taste of him. left him there to desiccate in bondage?

spanded. Theyer and I was objective

would ever let me study, what could be What makes us who we are is forever tenyour eyes. Yot I can never see any other was what you did to me Falher. You farbade me to hear any storyhiller but you it

Alten feit his past slipping out from under believe were so important to you I wouldn't have-

me ube said coldly. Why else would you have bothered to forbid me? But my mother and I get all the power you tried to keep from me You see Mother was not Gruhushood's sole. When you exied the you conject her. We just the stores together as

"What do you meen?"

"Linti you carre home to teach me. We stones that we could Without you

It consend for Alvin the noticeines mana-

Joetook the laugh all wrong. Or perhaps took it exactly right. He took his father by the wret and grapped him so tightly that of Receival on he herd Joe whapered. staved at home tonight. Perhaps I am not

Alon tord for a moment to pull his acm away but could not. What have I place to you use? he should inside tempol1 Then said Please

you will live forever in store in memory Loouidn Libe taken apart and recombined like all your little animals. And you were

I was gallous of my child," said Alvin

will challenge his supremary yes. It's the rideet pettern in the world, a tale pider then

Go on this is quite fascinating Trafuse

At the standellers know how for talk the same. Effor the children he like Gonlike Contella, and the father casts them out

loceste and Laps and Decipits 1 see where this is going." Alvin seld. "I thought

"Freud thought he was lefting the story own Just because the story of Ded pus"I'm not worried" it was a lie. It was a truthis understatement

"Laiss diad only because he would not let his son page along the road."

"Pass slong any road you please

"And I am the Devil You and Mother ware in Eden until I came Because of me you were cast out. And now you're in hell

How nearly it all fift

There you is inclusing your drafting your had

"This sant anything corring from the computer seat Aven "This is just you boing a normal resentual teen-ager 3 at a phrase that everyone cores through

Joes grip on Avan's am offy lightened Tickart de ladint water. Thave my power now and you're not safe 'tour house is broken, and you're not safe 'tour house is broken, and you and Mother and you know is Why del you come to me anopoli know is Why del you come to me anopoli hay wai know you avoideing destroyed?

Again Alivin timed to lind a way to failed out Joe's story within double. This time he could not use haid perced through shreld and armost and cloven time nets to haiet. If the name of Body, Joe how do we and it al?" He barev kept from shouling Joe relaxed his grip on Alvir's artill at tast The blood began to flow again, peanfully Alvin fanced he could measure it reserved through his reliablest attrans.

"Two ways is act Joe. There is any way you can save yourself

Alven looked at the cards on the screen

Stat leave used go away for a while Let us alone for a while Let me pass you by scop trying to rule stop trying to folde your story on me and than alor a while we can use what a charged

"Oh. excellent A son divorcing his father Notico ikely

Or death As the deliverer As the kultiliment of your dream If you die now you delear me. As Laips desiroyed Ordipus at last

Alwn stood up to leave "This is rank melodrama. Nobody's going to die berouise of this

Then why can't you stop trembling?"

"Because I'm angry that's why Akin suid I'm angry at the way you choose to look at the I love you more than any dhar tather I know loves his son and this is the way you choose to view it. How sharper than a recent it make

How sharper than a serpent s tooth it in to have a thankloss child. Away, sway!

 Lear ant (7 You give me the script and now I'm saving the cooldarm lines

Joe smiod a strange spherelike smid

It a s good ext line, though, and 427

200,1 m not going to leave, and Tm not going to drop dead, either. You ve sold me a tor Live you shot not the trist not rear dy but the way you rear things. That helps to leave how you see things.

Joe shock his heed in desper. "Father you don't understand-it was you who put those calds up all the screen. Not I. My reading is completely different. Completely different, but no better.

"It im the King of Swords, who are you?" "The Hander! Man." Joe said

Alvin shock his head. "What an ugly world way choose to live in

Not next and pretty kie yours in to bound about by rules the way yours in Laws and principles theories and hypothesiss may

"Joe Tithink you need help i said Alvin

Dont we all said Joe

"So do I. A family counselor maybe trink we need outside help

"I ve told you what you can do

"I minot going to run away from this Use no matter from much you want me to

"You already have You ve been running away for months. These are your cards hather, not mine

Goe 1 want to help you out of the-un-

Joe frowned Father don't you understand? The Hanged Man to smiling The Hanged Man has won."

Aver, der dig ahnen He couldnit the Commenter noch die neutrich bei hong eigstein wird her Mit about Arklin, aber teid sogstein wird her Mit about Arklin, aber teid die sogstein aber die hongen her einschligt record of atteit wei nappering wirh her different warend a ung wei skaret offen gelte hat manned a ung wei skaret offen gelte hat manned a ung wei skaret offen gelte hat hange frei Alter offen gelte hat aberge frei Alter offen gelte hat handlich Dirk offen gelte hat her beziehen die hat mit die her weit a her beziehen die hand holding the weit an handlich beziehen die her weit an handlich beziehen die honeen.

And maintenent of unusual clenty Aver saw that Job was right about everything. Wash Aver even now cleng said what the carde called for him to do to save himself, gang into hinding with the State Armself, gang stron being about all web being undore and he was setting out on a line journey that would lead him to software formatives. Soil biolitide

There was one cand that Joe hadn't worked into his story, however The Four of Cue. "This answers you" he had stad The hand of God coming from a cloud. Eljoh by the brook. I/ God where to wherein to one, when would it is ste?"

He would say Alvan thought that there is something profoundly wong, something capular in all that Joe has done. He has somethings that no other mind in



the world oculd have brought byather meaninghuly, lie is as DL "right and touching on the bootexe of Turn. But by God them is extending working concerning finds soverbooked. Not a instabilities concluding brock imoge logather in its own lie. Surgars the time of the second and the top of the time of the second and the top of dentries the second and the top of the area. The second and the area of the second and the top of the area of the second and the top of the area of the second and the second and the area of the second and the second and the time area of the second and the second and the second the area of the second and the second and the second and the time area of the second and the

Therefore no one know how much of Joe stated sary is behaved because it is how and how much becames that because to be when becames that because to be being but ho gifted percents being at take soon lives in the word the has created for air more and more people beliaw to this back became two

We do not have to be the herein of Laco to on others to play at being Law. I our say no to the stary, and make it falls. In that lake count left any other stary, because that lake count left any other stary because that is the oue that ne belowse, but I can oblings what he belowse by changing what the Catod say, and I can change what the solution say to being assences else

Arrig of Steerods Imposing my will on cones, making their laws or the workd mail my earch created. And new my con ito, doing the same But I can changel and to can and then packape in software. Ins in Splite can shape at balance world than the spit can shape at balance when on

And as he grew more exclude Akin fet himself sliwithight as if the cup had pound who him from the cloud. He belowed in fact that he had already changed. That he was already something other than what Joe and he was.

The telephone rang. Rang twice three times before Avin reached out to enswer it is was Conne

"Alver?" she asked in a small voice

Conrise The stad

Alven, Joe called me She sounded lost distant

Taid he? Dan't worty Conne every tring a going to be fine

"Dhi know, Conne said "Timsty rgunai tout to the bing that Helen rever fguned out if is the tangital locate never had the guts to do find knoe it though End could do it I love you Alvin. She hung up

Aven set, with his hand on the phone los thirty seconds. That is how long it took him to realize that Canne sounded always. That Contree was trying to change the cards too. By killing herself.

All this way home in the car. Aven was whet that his was going causy the least warring timesel to drive carefully cars take characes the wouldn't beat to save Careful the theory would care a would that was the same would care a would that was not fail that theory would careful a would that beat the theory would careful a would that would be would be a would be a would that would be a beat would be a would be then a would be a would be a would be then a would be a would be a would be the a would be a would be a would be the base would be a would be a would be the base would be a would be the base would be a wo

Stirrup a little excitement, give him English Leather.



Let someone else bore him with a pur of slippers or another lie. You know what he really wants... the great scent of English Leather Because English Leather drives women crazs.

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PERMIT ON LESS OF TAXABLE AND THE PERMIT OF THE PERMIT

and you're being slow to she can suo creed but telling yourself youre being

No said Nwn agen and agen, pulling on the accelerator weaving through the twife: than forcing harrast to slow down terwise wrong, maybe stee hadn't taken prisslow himself down so that Connie would deand svorything would be a mple rigain-

He out there furnished with the key, and hurst inside "Connel" he should

Joe was standing in the archway be

she was on the phone to you I forced had

STO S DADAR?

Ion since of and and Awr waked no and aslament ham At least she was not hopelessly insone. So it was not too take Vine "Alve said still looking at Conne

The bean thinking About the reading

T believe it You told the truth. The whole

Still Joe clid not answer Wed, what can had to have the whole thing iny way and It really scrowed things up. Do you hear with Joe about the past. But not the future They don't tail the future. They ust tell the outcome of the pattern, the way things will and if the pathern isn't changed But we change the way things turn out. Wait I'm

The other, these were the raot words tace was conjorted with sage his hands trempling teers steaming down tes chooks

screamed at him. You can't just let it be,



can you! You have to do it again and again

Ch. I see. Alan thought By warting to change chings, I was just making sham more instan / click t thank it shrough well enough

"I'm sony" Aven said

"No" Joe shouted There's nothing you

You're notit " Alwin said, trying to calm Jon 1 should just have-

Don't say anything! Joe screamed his

Twant I wont' said Alwin "I wont say

Nothingi Nothing! Nothing!

I must agreeing with you, that a-

his father a face. God damn you don take

Tore and Alver suddenly realizing " see-as long as I try to put it in words. I m

These were no words left for Jpe to say. on the addetable. Joe did not mean to grab glass dish

But it was the clish that broke inst has further a head. And the fragment of glass in the sharp edge of the glass out nearly through the flighty bloody wholy part of the traches so that no more an flowed tax throat chitching at the pieces of glass

"Uh-ch' said Conne in a high and chéckih voice.

Alen inv on the back on the floor. No head propped up on the front edge of the movers, not surreng his head, watching

and skywly torp at her hair he watched as bloody piece of glassa into his right eye and then one has left / see now said Alwo si Agong the annual to the notale mail dewound us my Oediput i'm just not good at making. /m streed DO

ooked onto his trouser legs and dragged him hibe direction of the dome

auti%matter

Curvery services and Taylor a colorisation to the way to Bob Taylor a colorisation to the services and the services and the werehead to the service of the the the service the useful participation the adding works and the adding work

Those words stung the sixty-one-yearvid Statismin and he left competies to adve his credibity So he picked up the phone and called

All do that there are been as well ways the local balance and set of the desired period. One of the set of the set of the set of the desired period. The set of the desired period. The set of the set of the desired period. The set of the set of the desired period. The set of the desired period. The set of the desired period. The desired period period period. The desired period period period period period period. The desired period period period period period period period. The desired period period period period period period period period. The desired period period period period period period period period. The desired period period period period period period period period period. The desired period period

Historing to the apat that afternoon with Wark Taylor panelet to a par of ten foot long buildcare tracks set seven least apart. Encircling the tracks were 32 holes, each three notes - diameter and three inches deep. Taylor saw this



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> But a for group in Ave ben calling Campbell is theory rubball. Arrange the descent of the second second was some kind of lightness there would have been severe here and bound group. Due Barry a Isan prysock and ball lightness general ar Hugs Arount bandgroup als boestnetters bair occe while the

> Bob Taylor a story is set repeated by Lwing/Can acheochildren with know term as the main that daw the LPO New relived the often restricts to the familiar trend ofcen ng. The spot sectors to be a magnet an i Timidrawn them the says that make it is to perform a backware the says that make it is the performance of the 201 that work the lowery CPU Motivate

mistakable mark of a spacecraft. But to uargearc Wark, they were an engrea one that deserved senous investigation.

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There is always another read and no the long. Mount of Maturi





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MEAR READY

These social to die offen lise men live fresh before trem fluit, according to psychologist Kenneth Ring of the University of Conrectaur people who accore from boats of linical desith region (glimpters of the facture as with

To source the visions of non-dealth processions, Ring invested the country topicrecording tables with more than a dozen survivors. One of his subjects for heterox, was a man who had haven, succurrende to appendice to succurrent to appendice to the save hissel grown up and manipal with new chicken his envisioned meet stored with save chicken his envisioned meet stored hing with source of sourcefring, with source of sourcefring.

This very socre subdomy unfolded one day in 1986 the main told Ring, when aud in a chair reading a book and huppenhol. O gatese at my children i like aboot the the was the memory from 1945. And the shange object behind the sometony from 1945 And the sometony from 1945 and the sometone gives as a child.

Reg neard ubject attack subject report uncerning in pre-onition of things that they say leave since come integrated which attack who repared by those who repared visions attack the hol of the work

Indeed amount all Ring's subjects have propheted a deastroll epoch that they search will begin it a dec arte or less. Some takes teresen particulation with the concest and circulation orbers. Issues and huices way "White most of us undoubtedly would perfoltion. Bring is subject way that precess with significant previous. The truster with they constant with decoder of beings of performance.

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--- Glenn Van Warreboy

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8.5 inches and weighted no more than 18 grams a little over helt an ounce. Yet it had to be storing amough to support the barbel weights that were slowly piled on 1.4.55 pound incompetes. Is (investigation of the barbel output of the bar

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The adult judges swald points not only for efficiency but also for preative talent The McLoghini ream membraik who wich here regional and water on is the national comparison dresped up their act by the hear bair operating where not be their the national late, a group of two boys from laters calculated Hery School to take the national late, a group of two boys from laters and set Hery School to take the national later and provided laters of laters where our any of the boys from calculated laters and set and laters and set and laters and set and laters and laters and according to the later of second action of the laters and according to the later of second action of the laters and according to the later of school according to the later of the later school according to the later of the later of the later school according to the later of the later of the later school according to the later of the later school according to the later of the later of the later school according to the later of the later of the later school according to the later of the l

At one paint during the competition the McCaught in year thorem more autostatitive creativity. Sharky tables the OW events began they realized they teed nothing on they vehicle that could pack up tand. The inght before the competition we took an old plastic flowerpoil and model in this a scoop. Krisht Portlage natides. Not city and the solution work well buil ther comtreation uncertary resemitations to the Wear Mang probe scoop, which MKAS.

Most participants some inform the socalled Takines and Girtsd (TAG) progeness Marky keel this is a program these techsitem have long needed. We do a lot for the athlancally ghod student some Agent Dickernas licitad (delited tout resp table for the interfactually ghod student for Ortigates Clickamas licitad (delited tout resp table for the interfactually ghod child most derive intergrafic. The GM organizers self if as more then part piczy intellectual and engineering exaccians. For one thing. Somial Monka points out GM heps date out some of the youngakes, include while. The seen medoors students be really good helikers on these problems?

For another is gets them to practice, valuate shifts. The world these young people will inferr as adults will be filled with quastions that world be serviced in books, says Keely Clark. To solve them they it need diverse ways of thinking and aughtoring the have no blass which knowledge they'll need in filleen years but we during when here to robe solving waits.

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But the Illiac, in all the glory of its mogathose will stand as a more dwarf beside the rexit generator of NASA computers the Numerical Abrodynamic Simulator. This machine will have a speed of a gigalicp a billiab coartitizes role account and and a billiab coartitizes role account and and a billiab coartitizes role account and and and a billiab coartitizes role account and and and and and a a billiab coartitizes role account and and and a a billiab coartitizes role account accou



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hope you won't have to go to too much trouble getting ready for the holidays either. So you can sit back and enjoy this happiest of all seasons with your family and good friends.



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The comparison is not a negative method of the second seco

Researchers at the Langky Research Center in Virginia have long plenned a subable set orall the Hypeneter Bisearch Archell (HRA) It would be rocketpowered about the size of a lenge further plane and cented stoff by a large just such as a 747 peakety perched on its beck like the shuffle orbiter When let loose into hear high a reackas acaddhan to live trucus on to cat to dward acad a series and too board oney. The would not be loging to the max 1-bits was and higher 30 years ago. There the committee would came an moving tight without he aid of coeffer them meson accompliant of the 144 would grade them and the series of the series of the series would be also be an accompliant of the the meson accompliant of the series of the Magnet Desert to a battering on the ory Magnet Desert to be there horizontal landing and to nocket present of the 10 (1 to 1683 a batter) of Camera and the Magnet Desert the the Magnet Desert

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By 2000 is 2015 our expenence with HRA B together with our firm background in studying hypersonic dataget of computers would put us in a drong poetion to go ahead with Star Relev. A kinast within the geropace industry the final decision to poceated might by then be to downue to be hermal strategies.

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LUNAR HABITATS

The detailed plans are now being laid to transform the moon's barren landscape into a flowering pasis lif for humankind

BY JULIAN LOEWE

aniend s has already begun Much of the engineering immars to be worked out, political and economic commonants have yet to be an adds Eui scientific and addinicate all reasesh cataloss all across the country are working on the runs and bachs of land reincration. There work could ge of the science that most people respect

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PAINTING BY TIM WHITE

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That every of mangrowers caught the air tendence of characterisation working on NGAS materinate processing and space project was been to thereign actual what would take to gut a permanent base on the moon. The work that all sorts the observes has have leagn data space want to be it entry of facilit to design a find of the it entry of facilit to design a find of the processing wave you be right just adapted on the thirt attay for a about the work here go formed table to about the work here go formed the working a sort control control work.

Again Dry turned to the motionals nature had provided The moon it sums out dould supply more than 90 percent of the homecoverable elements is colony would field.

As a contensitive or space industry helds at Princetos. University serveral yours ago John D. Macdomosa and Rec C. Clandge Applied Sciences expecting Tank and Applied Sciences expecting Tank took samples returned how the amon by Applie T Applies 12, and Applies Teams to the minimum california field in teams Tanky abor (sumd that presents an electric based original that the other than the serveral minimum california.

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To make this process work of this scalar of a lower healed. Dry saw, "secretally what you do is to recomputer evolutor. You start with some regise that ald blacters above the theory form the basis or a food chain. Though their is not with sure where mitogen can be obtained the same where mitogen can be obtained the come torom the moon healt. The install a

 Dry set out to plan man's first primitive kinar base
and came up with a scheme that might eventually turn the entire moon into a lertile, Earthlike planet?

plants and animals are added they form a balanced self-supporting ecosystem. What you wind up with Dry Says "IS a controlled lenation.

The L-B project down tium quile that lar shead. The 40-minitian wolfning group is alor by 2P Renalish Petrini a noted House Ion activist. People trivia been telling us that wane two hundred years before our time buil dont before this. Petrini die clares this goal is to detagin a kinat bean hat acait be but whin the next bean bean that coalt be but whin the next ten bean

One crupal considentiation is white the personnel will be. We believe it requires about thirty people to opniste in successful units taken. Petimin explains: "Each must have a minimum of three specializations to provide all the technical skills necessary for such an understang. No comparable crupa has ever been assocrabed.

Another concern is appead. The colonate would land during the lumit right to avoid exposure to heat and indiation. This Moustain architect proposal. They would have fourteen days and rights in which the boil of they shelter before sumae. There have been many construction proposals few will probably choose whetever will be instead.

We are even investigating the use of robots to hurry the construction

Therestain and assegnable and leads of the By John bearders executive densities of Second Mabearder association densities and a second second and a second second

The intra that about notive members to any use terrology operated historius is holden to use is terrology operated historius is holden to use its handport tamework, and the use not scale is before to a which operated the buildes the standport tamework, and the use of the buildes of the tame is pool to build the scale of the tame is the buildes of the scale of the buildes of the scale of the buildes of the scale of the buildes of the buildes of the scale of the pools is the loss of the design the loss of the pool of the scale of the pools of the tame is builded of the more.

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Peterin memorys another commodity that may prove even max valuable. "Whoever gets there inst will have a kit of important information to sell. Many of two will be premete the development of space prefer to grace that lact, but here is not mach outof that the military will have a deep to timete in observations made from the moon in that overit mining and many data inclumes modern the lattice divised.

If a lunar industry is established. Petrini estimates population on the moon could reach 400 after tan years. And beyond? "We should see the test moon below in thirty years perhaps much loss. he predicts

Whatever sort of moon base finally takks stopp a law necessates must be provided as water food water disposal and electrical power. Air seems partially guir amend by the dispositivity fail disright can be provided by the electricity at of Jalier cross. So tart we ofter resourcements have provide more difficult. Provisione for food and water disposal.

CONTRACTOR INCOME.

AMATEUR SPACE TELESCOPE

STARS

By Owen Davies

A the move than a decade of work: NASA's Space Telescope February 26, 1985: It had better launch on obsetate it is had better launch on obsetate it is closent NASA could find to larg-available of open-the-sky only the second observationy in space.

What could bear it is cometining called the Amaters Specer Mekacope (AST) row being designed by a dedicated group of callege students members of the independent Speciel Research Group (1993) beaaut at Remost ber Polytechnic Instatue in Truty New Yok, New Cely two years old, the AST might be ready for use as cert was mid-1984.

The project started whan some of us stugents want discussing the minits of space astronomy worplans Jasse Echemisub a former Renseleer student and lounding secretary of the ISRS "No docted it would be into all amateria astronomers occi/i have a feloscope huse in other I comertized that

And it has grown quickly. Founded in 1980, ISHS now has hundreds of members in 12 countries. The AST program, which gots is funding from the international Space Corporation (a private space-for profit company) plus contributions and GRG membership has, is in the final descent states.

As panelities and telecopes go, the AST will be small, about nine obtain fails and weighing 200 pounds. No because if will fly above Earth's atmosphere, if will be assonatingly powhell in almoutd pick out stars of the twenty-hard megnous-as dim as anything the syst on Moure Program can aske

Instead of photographic tim the AST wil use a digital imports your like those now used in a digital imports your like biological and a second second second second and the second second

Such potent equipment will allow enterurs to conduct astronomical studies now possible only at a few professional observationes, says Flan Molt a



Dust stores on Mass. Spectackes like this could be rounnely available to anywher astronomers 1% ONN- mechanical-engineering student who has been overseeing the construction effort at Rensselaer for the lest year

We will probably make regular planetary observations. "Mole regular britis the NAAS Space libeacode world have nearly as much time for that Curs would be an early werning device that ould detect an measuring cloud formation on Jupper or a dust storm on Mass in time to bit other observations know."

Not the orbiting balancepe will be structly for grassure, Schonlaub emphasized "This way solated by subdents, and we want students to have access to if the away. We have to set up school and planetasum demonstrations and receive increme. Form the satisfier

Still, those are some problems to solve before that can happan. Chell among thema, Who will all the socialities into active GCH industries, a floaging rockier/orhire business in California, hopes to have a bosoare operating by 1984. They are interested in supplying a lauroh." Excitements also

The other hope, of course is the shutter' he community "But our satelite doesn't really lit any of NASAs normal classifications."

More traditioner is the BChritog data challenge of putting a telescole in space. What women mis a how they are going to aim. If, days MSAs apsceleidscope expert Dr. David Lockware NMSA and the European Space Agencyhave been studying a one-meller talescope. Started, since 1973, and they selfhave not figured out how to hold it tested?

But the space ambients are unstallinged here years must be such obsolutes will be outcome. The ISR's rainway docusang when pradets to Suggestions include an offsting solve documentation high resolution, uninvokit tolescope a racio talescope, and a primate instruorbitar for mapping and performing periodication.

For more information about ISRG, write to The independent Space Research Group (PO Box 3046, Toy, NY 13160





HABITATS

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Each flask began with about 30 red thop, coll shrmps each about an inchilong. Each teak had a cup of artificial seawater and a scoop of imated algae and improorga ingens in aome flasks the shrinps cled while in others they thrived in a fee there are no vasble algale, yet the shrimps have surrived. And in others a welle variety of different algae have grown with different lends coming to dominate each fask.

To many investigates, is the lend of inrecipicable differences that makes, controlling acceptation measures, and and an link acceptation in the most except of the measures and the most except clair Following on the University along the device guarance at now the device link with any experiments who may achieve a link and the system and be much energy ontests the system and bitles.

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Whetever they do for the study of evolation, controlled-eccayatem experimental will eventually their apace criwel from the meed to import their food and original. NASK4, Jrr; Bredt beleves such a system will have be used on a spece state in low-Each order and later be tested on the moon. In puts is quarkan of time and more, he assy. If will take us her years, put to get hrough all the easies her years, put to get can thereafter we should be all to produce the more we should be all to produce the more more and the state of the data the more with the state of the data the more with the state of the data the more more that the order of the data the more more that the order of the data the more because the state of the data the state of the state of the state of the data the more because the state of the state of the data the state of the state of the state of the state data the state of the state of the state of the state of the data the state of the state of the state of the state of the data the state of the state of the state of the state of the data the state of the state of the state of the state of the data the state of the state of the state of the state of the data the state of the state of the state of the state of the data the state of the state of the state of the state of the data the state of the state of the state of the state of the data the state of the state of the state of the state of the data the state of the data the state of the stat

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for large issuentiated fractors to cerve long windows into the lunar acrospe powing the shady side of the Inflocks with metal cheeking to collect electrons driven from the bright areas by the inflocke surfacts.

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No on a sure where to tind water on the moon According to the Apollo surways the luma surface is as the scenario observed. Toty as the instelled is cow's shall in the New Meteo classificant burstel of the New Meteo classificant burstel or may werk-rularly be tought burstel and bursteres the moon's poles there is no guarantee it nons there.

Water is simply flydrogan and oxygan Dry asys and we ve already got a source of oxygan on the moon. The men difficulty then is lending a source of hydrogan

I he problem may not be as tenous as it seems, according to Genald J. Wasserburg, professor of peology and peophysand a three use brinks interchange of Lechnology, the method and the second of Lechnology, and Lever metersale are being vagorough portical Their is no prestrativity of water on the moon. Wassishing assists bar on the second bar of the second bar one of the second bar of the second of the second bar observations and bar wind. There is no headabar wind there is not a solubativity amount of water the second bar observations and water the second bar observations and water the second bar observations and the second of the second bar observations and the second of the second bar observations and the second bar of the second bar observations and the second bar of the second bar observations and the second bar of the second bar observations and the second bar of the second bar observations and the second bar of the second bar observations and the second bar of the second bar observations and the second bar of the second bar observations and the second bar of the second bar observations are set observations and the second bar observations are observations and the second bar observations and the second bar observations and the second bar observations are observa

Droo the water problem is acled the elegance of Drys colonization actions startia cut lie deterils are still vegue to to final product a clear in her mind is moon or which people can walk unprotocliad undar an open sky.

It would probably start wetmove or her bown glass connected by a network of unnels. These mean the luma exists would be strongly allocated by the mostrin loss mean strongly allocated by the mostrin loss means of exposition and containteest this cycle could only an embradi mechanism of exposition and containteest this cycle could only an embradi mechanism of exposition and containteest this cycle could only and the precipition on Earth. In the glass tabrestrong the week were in allocation mostrus, thading the week is the ratio mostrus, thading the week is the ratio. shrink when the colder right causes the vector condense. "she exclaims

As the dome profile tab and minese are used and more and more of the moon is suitable will be imade lettle. The observations, desired to 0 within a previous table on the one laceh of Barth a previous more to be table of the suitable of the suitable of the bart minuse effectives at multiple minuse been received. The detective at multiple minuse been used to more them ten years to head bearts.

Chill be moon, Dry thrinks, these our arrist con be induced by electromagnetic helds. These helds would be instead at frast to horize an another than the second second second deviatal helds is litter, de holps they might include the entire moon. Then the atmosphere produced in the demission at a discount and the many second second to the data.

Showly the atmosphere would build up, shelding apprent coemic news and radiaton hot safar faires. The sun sheet would be deshuted across man's second planet Eventaality there would be enough oxygen to support fine roaming animals. Someday the domes would be enrowed, farealis would be planted, and yeas would form in be impo areas.

And there it would be man's test coloneed world OO

COMPUTER MUSEUM

EXPLOR/ATIONS

By Al Furst

In 1960 a group of scientist from the Wassechurets innitized The Technology (MT) unwelled the Intel electronic machine of its send, chinistenical if the Werkend, and helped laber in a new Werkend built change World Was II as an gain is computer technology. These is world to the technology the World world built change World Was II as an scibb. Job Up three Toose, used 55, 000 vecuum tubes; and required 150,000 vecuum tubes; and required 150,000 vectors tubes; and required 150,

Ken Oleen and Bob burrell: Iwe young engineers who worked on the protect, later work on to become industry leaders Oleen bunded Dapita Equipment Oorpovation (DEC), the first immicomputer immicibility company. Even the interview MTHE Corporation an industroed miltary recounting proj. Both mere interview organeses at heard, and they still hold find mercanes of their days at MT

So they avere understandisky disturbed when 24 years later. They laterned that this Winklewid was on the way to the during Iby 17th American task was hepetopsy outdated. The Cambridge the second state of the second state state state of the second state of the second state of the second state of the second state state of the second state of the second state state state of the second state of the second state of the second state state state state of the second state s

But he Werkend was while any to a DEC wardnesse where is collocat duct for two years unit a subtle shaw coordinate of the second states of the Maximum which opened its closes to the paties the second its closes to the many high-the satching is only one of many high-terms in Markow Mean the new estiblishis cents: branches accloses to the high two does in the rest estiblishis cents: branches accloses to the high two does not seen accloses to the high two does not seen as

While the Whiteend was in storage, Dison and his colleagues scrounged around for more releasing the paid. At an Anny auctors they bought the TX-O the carlest transstorated completer—allot built at MT—bit a few hundred dollars the carlest temperatures. The Charlos Strik Deper Lube, an WT genetil donate the working problems of a computer on board the Apolio spacecult. The machine a minimum regested of the machine a minimum aspect of a degest, neverable proved the way for deal- inp computer. Along with the CNXBAR a Comman coding machinecame a fingment from Colossus, the product groups that damag product will be decode messages that EMMAR as an exercision.

Also these England dame at two-foot seque piece of long is called at those ' toos the Max's an electrochemical computer that two-file instructions on paper tage. Given Bel, who was appointed cause of the bulgeoing collection, sage the door was enginely removed from a Manchaeth at bolescom trains asset, it was operand with chicken theoremical Balance.

The facility is housed in a former RGP semiconductor plant divided into light galaxies. Computer generated mutats adoin the lobby, and there are plans to



Takien Tay computer brass pins and leadhinghts

pipe in computer music. The muleisant inside of the second second second second inside and the AAV302 7-- the last of the matmitted wavesum-side-bened computers still part of the Early Manney elevines asplatement to the second second material in Fabricary at which tarea t well be described in Fabricary at which tarea t will be described in Matthewa .

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The museum is not strictly for ecodemicrons, however Arrong of a frond prozed exhibits as the Triker-Ng computer. which was designed at MTX Articual heighgance tab it is made enfraily out of hing: brase provide the depths, and Triker Toys Achtead by human potent in newholkes has denough information stored inside is diluciate inservis to be unbeakable at 50 too for

The mackat is as board the works method of the second se

"We have the original mochine here and the original program," says Bell "Any water can play 4." But leave your quarters at home, folks. This is hintory CO



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Shooing from the hip as always De Lande offers other magins. There's a big fight going on between wideo and Septr 8 big 1 thins both are valid. Any articl

chooses his tools according to what he wants to accomptish. Sometimes I want the lack of kim. Is a photochemical indicative with softer edges (value to disctionic and has sharper edges to it. Colors we driftent. As long as the lock of these media, remain different the attat will choose which heat such his QUODE!

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and produced no original results. It a diffoult to justify any further investment in my conserve after that

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But when Dr Kahen greve her chrimitian and hattige there cells, all build hat the parent most occuld not have been RALING. She and DF Robert Averback worksally topod the error to Chranka River Brooking Laborations: Finally a yeer hell minimat been sating hybrid most existing hybrid most animatic as purchard BALBs. Approving one all the brooking animatic and excluded and way got block min a errorigi cabe

To made all exercises the discovery is chiling Charles Piver shift his world is again supplier of lab animals. BALBIC is one of its mait chan used variable. The tensueraiss of our findings cannot be overmit phaseed. The Kater and Alertbach state Davide Rhorts mostline cost them health a year of work and up to \$100,000 in weated research tunds. And binause fine BALBic is so common hundreds of other immedgators may tarve suffered the same mofortune it will be seleving years before the full extent of the colorety is known.

The has really pure a scene into policies says the hasceld Halfman who directs the program in genetic quality control for the National instrumes of historia. Studies in instrumeday and isocology are the crisis next at inst. Incom cost is million dollars to set up your late to test the safety of a single drug and there are about first-like direct roads until the tablearch."

It is possible to guard against datactive research insteriors but is fair from doty (genetic sair) of lissue culture is parts along and specificated work which fee liboratome can allord to partition to insty Savehal conculting liboratome plan soon to offer public partition to but but feere is much more work to be done than they can hope to accompliate

Dr. Heftmen a laboratory works full three to gued the ganade purity of the 20 strains of lab animals produced there. In the past five years are potentially damaging problemen have been brought to light inclusing two natural multipoten. But Heftman is the exchangement of the fort in the constraint

Des Kenneth Permine and Hintick Bitter Sueimen, of George Weikhington University in St. Louis, expanding solved such a probiser—after loaing more than a year's work on transplant, immunology backases a maps anneal supplem in England had seet them the wong much." Eventually we bought how hundred more tested all of trans, and used only the ones that we know were right. "D Pannian reports. "There were thirty-driven of them.

At bast, it is a poor solution. That is horsble to contemptate. Dr Kahan declares Not many people can do that kind of check halve a constituted.

Permine agrees. "Dr Bitter-Suenman is working to get legislation that would force animal suppliers to use before quality control, he reports. It alroads not be necesave to check up on them.

But unit such tegnitation is analytical the penalty for net checking can be even working than the inconventence of chang so. We were getting into a very productive pendo incor work. Penifine receils: 1 shut down as if a too of broke read takin or it. With the teld as compatible as it is and grint money backming increasingly acade you per creat advect to be away

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The best names of the year

GAMES

By Scot Morns

With close to 200 new home video campa Games' seemed inadequate This year illectrone we offer two loca-Ten Best Video and Ten Best Non-Video Games

newer systems not previously reviewed cartridge on that system. These are approximate and on the high sade Shop around for discounts

1 Donkey Kong (comes with Coleco/Vision of phonograph records and record players. 45a. Then came integrated mochines that

consolidator with a computer that plays not adapters games built for the Atan VCS and Mattel Intellivision as well. Colecoget to see the donkey Other CV cartridges that look good are Lady Bug to next arcade pames

2 B-17 Romber (br Metel Intelligion \$270, with voice adapter \$79 cartridge \$36) implivision has three new voice dependent of inschement with Mattella. on massions over Europe in World War It with yourself Fighters at three pickets that add to the game play and aren't use 192 OMM

Bomber and the solitaire game can go

We don't paracularly live the disc control Monting Dove Invine CA 92714 3 Mine Storm Icorpes with Vectors Arcticle continued it doesn't attach to a TV set

the resident game is like the arcade. Anteroids in both play value and visual maley Plasto some overlags add color 4 The Great Wall Street Fortune Hunt (a An apharumatic keypad on the Odvosev





Top Non-endero games (from Art), Towal Portual: Ovolesteen: Car Ward: Annahop: Touloude a
Despired in particle and in basistering the second second

I Program Circle Alan VCD: by Prename Referes. 2011. Not NCD: by Prename Referes. 2011. Not NCD: by Prename Referes. 2011. Not NCD: by Prename Reference NCD: Alan Schwarz (Strategie V Reference NCD) and Schwarz (Strategie V NDM Cytopic Schwarz, Strategie V NDM Cytopic Schwarz, Strategie V Reference NCD: Schwarz, Strategie NCD: Schwarz, Strategie NCD: Schwarz, Strategie NCD: Schwarz, Strategie NCD: Schwarz, Schwarz, Strategie NCD: Schwarz, Schwarz, Strategie NCD: Schwarz, Schwarz, Strategie NCD: Schwarz, Schwarz, Schwarz, Strategie NCD: Schwarz, Schwarz Other recent Activision carinogee all pool, in order of our pielesence Statmaster. Chopper Command, and Megamania

a Demon Antok (br. VSL by Inspectment Antok (br. VSL by Inspectment) and a second and a secon

10 HeA Bowing (CEAUX) When yours strend if the strend of the appendix model of the strend of the appendix model in the strend of the strend of the contraction of the strend of the strend of the contraction of the strend of the pected if for regulat contributing of the spatial peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend peak of the strend of the strend of the strend of the strend peak of the strend of the stre

THE TEN BEST NON-VIDEO GAMES

- Hill and is laboral our bases. Our choices and for the weating-insider, no the partments with the semplosity. The partments with the semplosity of accessible to possible who choice and galance accessible to possible who choice of the partners. We usually don't area for games the take a long commission of all mage and the second or piloy, or that require to learn each or piloy, or that require to be write and all one with the second or the and the second or piloy. The require to be write the second or the second to all words.

We steer clear of terms we ve already publicated in the onlarm (e.g., Uwe Mefferts puzzles featured in October and Pre-Man, a 1981 choice) We like to plug smaller contrastres when they deserve it rather than the game game, and we include mail ordering information for companias that may not have cutlets in your lown. Our selections are halou by price not preference starting with the most expressive

1. Bymonics Drums (Matter, 3150) II (9018) is clobal Knapa or a represent Reh you have probably dealined leving a net of doctime because they are other too expansive too tog or too level. New you can indige your fansases with Byrdenesk Drums. Nothing ike them has even ensate befase.

Smaller than a slide carousel and pressing building to get sounds of a share to a 'high hat) a regular tom om and pressure pads could be more servative-2 Banbow Stunt Kres (221 Hermotor) beach a child came up and asked "Are We aren't but Steve Ediakon a That orange yellow green blue, and purpleto hook up. Alummum submo and make the later expensive but durable and

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THE BLACK BOX-Address to cocarre, barbrurstee, heron? A leading

BUSINESS AT THE MILLENNIUM-What is going to be the hot investment of

OWNI LAURELS (AND HARDYS)-An annual review of the worst science science

RODY

automobile to an isolated area, where he wild pushed from the car. One made have arios under the most trying circumstantcomposence instead he telthimset to have been rendered less of a man, and he became virtually impotent. He too kipt

response to couldn't even bring himsell to to his wire about the temption exper-

seventeen. He had gone on a pionic with an older woman and two other counter

"For a while Merrista says "the worright percely tourised him. Then she successed to the men that they held her heach him auched at him and repeatedly told him to many if professional help could overcases, by the way I

Recause of the sparate of reliable data. remains in scientific limbo Many such sextrough women frequently have been. As porperiyator of mala rape, as lar as we know

It clearly does not seem to be a case of to save sexual relations with a man Tho women mands have banded rafter to beand to consider thomselves to be-altractwo Why then sape assaud of seduction? Rapa sava Virginia Johnson-Maiters 18. not to be confused with lowerneking, it is not primarily special or erobo, but rather an control over a beipleter votim

Whether man rapes women or woman rapsaman the sexual high derives not from satisfying but from satisfying DO



disappointments, but under a strong steady who't these babies will make you grastest rumber of Rambowi Roan in a trains 50, and Edeken anchorod the 300pound test lines to sandbags to keep form hern public it in San Francisco Bay

3. Amilitan (Derry SS), Anthur C. Clerke is Waldo has come to 14e. Two politicial comtrollupto as applicable simultaneous movemetres of this mechanical hand. Test your destrory in prolong up moving and placing erral capacits. It shart much of a gamebat lake Bg incide and solverer's Sky Winniit's great for allowing to differs. Everyone will want to own it a fity.

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policy Robert Smith? What four summers have been shared by two U.S. presidents? What is the largest samelike orbiting Electric? Top quality production accounts for the owners enther high price.

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6 Shrinsa Carcuit og Detecker Salart Philators US 357 Tevers fundt hele Sanharasso CARMID SD salar Ste de stjengel A wedning same salar Ste de stjengel A wedning same Romen en soutkook wit fin occust (or persentials), an offension salar salar



ars pintly discussing dues and fileonos. Solutions aren't simple but are generally satatying. Come all you taker Street Incoulars, the game is about

7 Domination (Mitton Bradley, under \$10) myolying for two players and quate a dalable with well-presented instructions, it has amagenes we ver to fathom it looks like vortics of 1990 Sackson owns the world's tainest collection of board games, with more than 15 000 in his New York frome 8 Trax (Excelibre Games Box 32407 A simple boarcless two-person girms that contains maps for the unwary and summa-9. Car Wers (Strive Jackson Games \$5) Wargement that fill up a room sized "board and take several days to play can now be to party in a pocket cost 55 and can be learned and played in minutes rather than imposing tag brothers. Jackson's best in-

HONORABLE MENTION

 Rubik's Revenge (Ideal, \$12) If you thought the original 3×3×3 vensors will two pays beins a 4×6×6 humbelor

2 Eternal Suspension (Ibox 875 North Michigan Avenue, Sure 1557 Chicago IL 60611: gold-plated executive version, 319 86 paus 22to shopping) A competing soltane text of steady hands and steal nerve, using readual respectant. A text of tanguility. If you do well at it, you I never used Valum.

3 Frage Ton Bends \$300. One of the bed wide digitize over on a hind-hird electronic game Regar papes and battle peday most being the water howing. Getling the leasts and sarry. Other electronic allowant, Ire on here was but constitution allowant, and the interval to a set of the data of the set of the set of the set of the constitution. Star Head, Charl Batteren (Cancil). Star Head, Charl Batteren (Cancil). Star Head, Charl Batteren (Cancil). Star Head, Charl Batteren (Cancil).

7 Means (Surtax, SO), A high price for a said game (an 50 cand data), full worth in formation of the source of the source of high source on the source of the source of high source source (or total not be been a source) as soon if you've work wordened with Mar The soon if which are been all on a primerary but Meng allows many or any Man Soon if you've work work developed with Soon if you've work work developed with the soon if you've work work developed with Man Soon (Soon if you've work work developed with Man Soon (Soon) and you work work developed with Man Soon (Soon) and the soon analyou (Soon) developed with Man Soon (Soon) develop

4 Call of Chruha (Chaosum Inc. \$20) A tantasy role-playing gams set in the Roaing Twenteen America? Yes, there are no elves or chappenables. Es wenter than that, because this gams is adapted from the terntying supervisional world of H. P. Lovecast Object of the game Survive unddon't or chappenables.

9 Nerl Ping Pong (Parker: \$10.00) The name says it all Now you can precise that forehand smash on the drining norm table without working about marking the tristh Good parke, good price

Answers to Triwal Pursuit questions when', "studion normal, all tacked up" Agette Christie, Wollman, Jack, Adene, Hamson, Johnson, Rossewill, the moon

For their assistance in suggesting nominess this year we are indebted to gamesters Phil Witswell, Bennie DeKoven, and Rick Umbaugh DO



oday could be solved -- economically

Twan Cali

Ben Bowite Prof Word was worderful. The question a lis anyone else out there in Moviestand interestion in a liter and technology makigeness, and savy are all normalized and the same side opposed by only a normalized without not subgitely wapped scientists was was not upper profrearly seatures hotes-stream busgees and well often water?

Donald Ely omhohocken. Pa

Pie-Q | Moto

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The new of these errors is the determent init: the replocation rate to provide applications experiments is systematic 5 percent when and the cap back systematic former they that happens less than 1 particular of the improvements allowed provide applications of 1.544 papers and research reports published in particular of the they applications of the published in 1972 corrected at the published in 1972 corrected at the published in 1972 corrected at the published in the published in the published of the published in the published of the published of the published then 1 corrected of the published of the published the published of the published of

The second correlation is to the sertion. According to a lond Callbag of the load and the second service and the load and the second service and the second and according to a 100 for service to a second accord second s

Finally the sentence reading. "In psycholenaus, mind over matter the success rate is reportedly running as high as 70 percent," as originally submitted to Ceres to us, field the additional words. "accord

ing to Marcello Truzzi — a critical change ance the figure was reported to us and was nee the result of our own survey. This statistic covers only a angle category of exponent.

We regret any confusion or misunclesstanding that may have occurred

Stephen A. Schwartz Motivus Group Los Angeles

SE AdM/25

Recently I Istenaci to Ponald Reagan's State of the Union Address and was terrified by what he said and what he left unsaid.

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The SF field seems more concerned with parties addascant space-opers fantasee, fancines and Hugo swards than it does with holping to bring about a more humanwho will polying to bring about a more human-

Science hotor has been saidled with the mercener excepts hotor. The should be SF should serve as a cauge of the present southor and suggest possible of tectores for the future we must try to implement a new states by teking addon inseed of histor from 6.

> Paul Abeliks Brea, Calif

Friends of Endencered Species

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If you are interested in more information or would hive to bein, write in

> Friends of the Earth 1045 Sansome Street San Francisco: CA 94111 Lorna Salattian New York Oft DO



PHENOMENA

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LAST WORD

By Daniel S. Greenberg

 You've got to be m gene splicing, cloning, and DNA these days if you're aiming for the big time The Mega-Chicken Project is top priority [●] which have been and board pack-table and the here have a sub-board pack-table pack and the here and the here

postocal now and needs in many row the pointress who control the reanty for science have short attention spans Remember or any research, for example? Ornal Skie

Swinger II's dood, gone, we got out before it ceved in We did okay on converting coal to of but when they got trad of that we waved 'em with a near propose converting of to coal

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Onto Any other proposity? Searger Oh Ista of Henri For existiple, you've got to be in gane spicing, downly and DBA henre days. If you've earning and that henre days if you've earning to that big time. At the moment out top process at be days Oncolean Proget Demit Maga Oncolean Proget

Sweiger Certany into their mousing would be reaken it such weighted the or an position. So why should the positry industry tall be breeding shrimps, so to speed? With a dustrar ton chokier, we could reap some real profits, hough ont an such as we monetable foodb. AREA, WEAP, &

We have to be inickegned and replaced

Owned Yot I see You cruce ware vary active in arms-coretox valeranch What's points on in that field?

Senger The claud up and down. Teensy vanit aligo ve did tip of her seasauth organization for the Pentagon. The Correr for the Resolution of Corrifol Thesage Vuolance The Cold War write or and the knotch-teen-dated infold with on tap There carrie obtains. All of a suchas the aim read to get all along with the Auspans. So we had to motificial the carrier

Now we to opening it up again. The market for nasty riseasch has picked up and we prain to be on top of it. That is until the Antijnother and the Busilians start servel-balling again. You can be twee that will happen eventually:

Omm, What other plans to you have for isoure research?

Swinger For one thing, it is plainly lims for us to be revaining the Breakthrough rest do

Omnr. The Breakthrough Institute?

Seenger the at ellow this operation research is a slow business thist it takes years to produce research results and that sematimes a research project may real per out at all.

Censor: Thus to trule

Barger Weil polycens schill kay the Every weil to know which a know which cares and the income large gase year advances and to the advance by socking the variable to the advance by socking the variable to the advance by socking begins the area well able priving the metalitor projects the area well able priving the metalitor the variable to the priving the metalitor able of the priving the metalitor able to the the socking the metalitor able to the begins and the privile able to the Asserption of Tableta Funda as well as the beaution of the beaution of the to the Asserption of Fundata Funda as well as the beaution of the beaution of the to the the beaution of the beaution of the to the the beaution of the beaution of the to the the beaution of the beautin

Qrest. Do you see any major new fresh opening up for your research

Swinger: We see a gold mine in encodica

Onto Why to Did.

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