THE SCIENCE NEWS-LETTER

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SURGEON CUTS WITH ELECTRIC NEEDLE

Delicate electric needles, that part the tissues before they actually touch them, and render surgery less painful and dangerous, are to replace in large measure the gleaming array of scalpels and other sharp instruments that have always been thought of as the badges of the surgeon's profession. This is the prophecy of Dr. Howard A. Kelly, one of the leading surgeons of Baltimore and for many years prominent in Johns Hopkins medical circles.

Dr. Kelly has developed his instruments and technique to the point where in his own practice he has already relegated the scalpel to a secondary place, using the needles for almost all of his more important work. Among the advantages he claims for the new method are that it causes less pain and less bleeding, necessitates less handling of the body tissues with the fingers, and is followed by more rapid healing. The path of the needle through the flesh is self-sterilized, he states, so that there is less danger of operative infection.

Dr. Kelly cautions, however, against over-confident use of the new method by inexperienced persons. "These methods are not to be learned completely in a week or a year," he says. "They call for careful attention to a new technique, for discriminating judgment in their application, and for increasing boldness with a growing experience. The concept is a new one."

LEGISLATIVE ORTHODOXY

By Dr. Edwin E. Slosson.

In 1899 the legislature of Indiana undertook to establish a new value of Pi, that indispensible but inconvenient number which represents the ratio of the circumference of a circle to its diameter. Certainly this needs reforming as much as anything in the world. It begins 3.141592 .... and goes like that forever; at least nobody has got to an end of the decimal, although mathematicians have worked it out to more than 700 places.

So when an Indianian ex-teacher offered to give the state the right to use free in the state schools his proof that the true value of Pi was an even 4, the legislators jumped at the chance, and a bill establishing that value was introduced and passed unanimously through three readings in the lower house, and two in the upper. Of course, like politicians generally, they never thought of seeking expert advice, so Purdue and the state university were not consulted; but a member of the Indiana Academy of Sciences, C.A. Waldo, coming in to see

high in carbohydrates, but the whole experiment suggested that a very real difference exists in the efficiency of metabolism or utilization in the two groups. Because of economic necessity, it is stated, the Chinese may have developed a diet of such a combination that there is a maximum utilization for a minimum intake.

SCIENCE SERVICE, LIMITED

(A book review from the Chicago Daily News.)

KEEPING UP WITH SCIENCE. Edwin E. Slosson. Harcourt.

The world has been full of a number of things
That never were known until lately;
Since science found radium, radio, wings,
She runs where she once walked sedately.

She burrows and flies, she broadcasts and pries,
But hiding the sum of her knowledge,
How great she has grown she prefers to have known
Just to certain professors in college.

Then, thanks to the scout who has ferreted out
The latest and best of her treasures,
Transferring 'em all to words snappy and small,
From sesquipedalian measures.

The best and the last from that science field vast,
He serves as a food predigested;
The gist and the meat for the man on the street,
Of savants from Einstein to Breasted.

Psychology slants and cocktails for plants,
The bee's knees, the kitten's pajamas;
It's science, but, gee! Any flapper can see,
As well as your savants or lamas.

The South Sea Islands sell copra, chrome iron, mother of pearl, vanilla beans, coconut oil, phosphates, sugar and other tropical products to the United States and buy petroleum, lumber, hardware, iron and steel, flour and leather in return.

On September 7 of this year, the hundredth anniversary of the invention of the steam locomotive will be celebrated in England.

The faintest stars visible to the naked eye are of the fifth magnitude, while with the largest telescopes photographs may be made of stars as faint as the twenty-first magnitude.

The average salary paid to teachers in one-teacher schools last year was $735. according to the U.S. Bureau of Education.

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after the Academy appropriation, found the lower house calling the roll on the final reading of the Pi bill. That evening he visited such senators as he could see and gave them a lesson in elementary geometry; consequently, it was defeated on its third and final reading in the senate.

If it had not been for this accidental intervention the teachers of Indiana would have had to teach a false formula to their students, and what would have happened to the trains that went around the curves laid out on this figure, and to the domes of buildings and the arches of bridges, and machinery made in the shops, so calculated, is appalling to contemplate. The Egyptians 1700 years before Christ had figured out Pi as 3.16, so that from yonder pyramids thirty-six centuries would have looked down upon Indiana. I do not know what penalty was imposed by the Indiana act upon a teacher whose students when they measured a circle got an illegal result. A statute of Oxford University in 1583 provided that any master or bachelor who deviated from the doctrine of Aristotle on any point should pay a fine of five shillings for each such offense. I do not know whether the rule has been repealed yet or not. Probably not. Oxford rarely repeals. But while it was enforced a teacher could not often afford the luxury of mentioning that the earth moves. A school prospectus of later times announces that students will be taught either that the sun moves or the earth moves, according to which parents prefer. Perhaps our private schools will soon be inserting in their application blanks; "Please specify whether you want your child taught the monkey or the Mosestheory."

Heresy comes higher than it used to. Instead of five shillings a teacher in Tennessee may be fined five hundred dollars for each offense of teaching "that man has descended from a lower order of animals." At that rate, a teacher might lose his year's salary for a slip of the tongue, or for pointing inadvertently to a fossil bed, from which students might draw an illicit inference.

It is amusing to see that the newspapers in referring to the law of Tennessee and other states requiring that the reading of Scripture in school shall be "without comment", call it "Puritanism". On the contrary, our New England ancestors insisted that the Scriptures should not be read without comment even in church. They denounced such a practice as "dumb reading", and condemned it as savoring of the ritualism from which they had revolted. The minister was required to expound the chapter passage by passage as he read, lest it should be heard unheedingly or misunderstood. When later some of the city churches began to introduce the custom of reading the Bible without explanation it was strongly opposed as a perversion of the faith. A good old orthodox Puritan living today would probably take his children out of a school, where the Bible was read without comment, from conscientious objections.

RECENT EARTHQUAKE UNDER PACIFIC

The severe earthquake recorded by seismographs in various parts of the world on Tuesday morning, July 7, at about 9:15 A.M. Eastern Standard Time, was under the Pacific Ocean, about 100 miles west of the southern tip of Lower California. This announcement was made by Commander N.H. Heck, chief of the Division of Terrestrial Magnetism of the U.S. Coast and Geodetic Survey, Washington, D.C., and in charge of the Survey's earthquake investigations. Determination of the position was made possible by reports sent to Science Service from seismograph stations at Georgetown University, Washington, the Dominion Observatory at Ottawa, Canada, and the Coast and Geodetic Survey's station at Tucson, Ariz.

Commander Heck stated that there was close agreement between the three reports, so that he placed the epicenter, or the point of maximum violence, of the quake at longitude 112 degrees West and latitude 22½ degrees North. "The vertical tremors seem to have been most marked," he said. "Probably there is no connection between this tremor and the Santa Barbara quake. The charts of the ocean bottom, made from soundings by the Survey, indicate that there is a deep narrow trough at this point parallel to the coast. It is at such places that submarine earthquakes usually occur."

EVOLUTION SELF-TAUGHT

By Frank Thone, Ph.D.

Don't rely wholly on your teachers and textbooks. Don't content yourself with pictures when you can see the original. Teachers and textbooks are good as guides, but not as substitutes for thinking. You can see wherever you go the same things Darwin saw, and decide for yourselves whether he was wrong or right.

I. SEE FOR YOURSELF

Most of the popular writing and talking that is now being done about evolution sends one too far afield. It draws its examples and illustrations from unfamiliar things in distant lands, like ancient skulls from Java or Africa, or the young of some unheard-of bird in Central America. There is, to be sure, good reason for this, for such examples are the best that can be found anywhere to illustrate certain points, and sometimes the points they illustrate are very critical and important.

But it is not necessary to travel all around the world searching for evidences on evolution, as Darwin did when he was a young man. In the fields and woods about our towns, in our back yards and gardens, even inside our own skins, there are innumerable things to remind us of the truth that "we are all members, one of another."

Why, for example, the monotony of having always only one nose, unless we are all descended from a common ancestor who had only one nose to pass on to his offspring? Why always just two eyes and two ears? A rabbit, whose safety lies in seeing or hearing his enemy coming, could do very nicely with eight apiece, while the blind fish of the perpetually dark and silent caves do not need any at all, and yet have them, or at least the remains of them. Why always two pairs of legs, or of legs and arms? Why should all animals that give milk have hair? Why such useless hang-overs as little toes, vermiform appendixes, tonsils and ear-wiggling muscles?

If we undertake to claim that Omniscience made each plant and animal species and variety separately, according to a special and perfect design, it becomes at once apparent even to our limited human intelligence that Omniscience slipped up pretty badly in many places, by sticking too obstinately to minor variations of a single pattern. If on the other hand, we can think of an ancestral backboned animal with one nose, two eyes, two ears, and all the rest

an ancestor in whom the organs now useless served a real purpose - then the riddle becomes easier. If we can imagine further that all this physical heritage passed on by our common nth-degree great-grandparent has been changed a bit here and there, as traits will in family descent, being emphasized in some of the grandchildren and slurred over or almost lost in others, the riddle becomes easier still.

One can take any one of the larger classes of animals, and find such a general underlying plan running through its whole makeup; insects always with six legs and two pairs of wings; spiders always with eight legs and a web-spinning apparatus, and so on. It is the same way with plants; Lilies and similar flowers with their parts always in threes or sixes; apples, wild roses, and their allies with their parts in fives; ferns with their leaf-veins always forked. It is a great game to go out and see how many such family likenesses you can find for yourself.

"Yes, there are many resemblances; but how about the great differences?" the objectors will say, triumphantly. "All backboned animals are four-legged, two-eyed, and so on. But fishes and reptiles have scales, birds have feathers and mammals have hair. How about that?"

Let us see. Scales in the first place are simply extensions or thickenings of the skin. The big scales of an alligator, the little ones of a shark, and our own finger and toe nails, are examples. If they become crowded, they overlap, like the scales of fishes or snakes. Frogs and the other amphibians have entirely naked skins, so they don't figure in the problem. Feathers are also extensions of the skin, and are made of exactly the same kind of material as are scales. Hair is also an extension of the skin. So a "great difference" disappears again into variations of a fundamental pattern.

Other apparent differences go by the same road. Allthe backboned animals except the mammals lay eggs. But the mammals also produce eggs; only they hatch them inside the mother's body instead of outside. The mammals are the only animals that give milk. But milk is merely the product of certain fat-forming glands, and fat is nothing uncommon. All the backboned animals except fishes have lungs. But fishes have swim-bladders, and it has been shown recently that the fishes make use of the air in the swim-bladders when the oxygen-supply in the water gets low. Moreover, the lungs of frogs and snakes are surprisingly like bladders.

The argument might be carried on indefinitely, for there are infinite examples that could be used. But the best arguments are those that you find for yourself.

II "SHOW ME A RUDIMENTARY ORGAN"

One of the favorite methods of anti-evolutionists is to ridicule the idea that the parts of an animal develop in response to needs for them, and that they vanish with the passing of such needs. "Show me a rudimentary organ" is their cry.

It is to be noted that they lay less stress on the vanishing of organs no longer necessary, like the appendix, which has become a mere rudiment, or the little toe, which is on the way to becoming one.

But even their demand to be shown an organ coming into being can be answered. It can be answered in two ways, first, by examining representatives of various branches of the ancestral tree, and second, by examining the development of the individual animal or plant.

The arguments of the "antis" always begin by assuming a grown animal, a dog, for example, that lacks, say, its eyes. Then they say, derisively, "These evolutionists ask us to believe that the eyes developed where they did because the sunlight fell especially strongly on just those spots. What nonsense!"

It is nonsense. Dogs aren't born without eyes, and they don't develop eyes that way. No one ever said they did. To find rudimentary eyes one must go away back, to animals on the borderline between those that have no eyes at all and those that can really see. One must go back to animals that know the difference between light and darkness, and yet cannot see objects -- animals which, so far as sight is concerned, are in the same fix as we are when we have our eyes shut.

Such animals are not difficult to find. If you live anywhere near a river or shallow lake that has a bed of mussels or clams, go there some bright day when the shellfish are all lying peacefully on the bottom with their shells. Hold your hat or some other large object between them and the sun, so as to cause a shadow, and watch them close up wherever the shadow falls. Yet you can't find an eye on a clam in a thousand years. They simply "feel" the light with some other parts of their bodies.

Or dig up some angleworms, and place them on moist earth in a dark room, with just barely enough light to see what they are doing. Then suddenly turn on a strong electric light, very close to them, though not so close as to heat them up too much. Angleworms haven't any eyes, either, but on each joint of their bodies there are spots that are sensitive to light. Another and very different kind of worm, the flatworm, has just two brownish spots near his head, and that are sensitive to light. Away back, somewhere around here, the two-eyed idea became established, and it has persisted ever since. What happened then is quite clear to anyone who can use both reason and imagination; and it was exactly what Mr. Bryan says did not happen.

Again, take the business of getting legs. To save time, let us begin with the fish, the lowest of backboned animals. Put a good, healthy catfish down at some distance from the water, and notice how much he uses his two shoulder fins in his efforts to get back home. Those fins are really balancing organs - vertical rudders - and not legs at all; yet in an emergency he uses them as legs. There are a few fishes, like the climbing perch of the tropics and the tide-pool blennies of our own ocean shores, that make regular use of their paired fins as legs.

In the next group above the fishes we find, besides frogs and toads, the newts, salamanders and mudpuppies or hellbenders. These are sometimes mistaken for lizards, but can easily be told from them by their naked, scaleless skins. Their legs are small and relatively feeble, and can hardly lift their bodies off the ground. Mostly they slide along on their bellies, just pushing themselves along with their legs.

Then we come to the reptiles. In this group the largest members, the alligators and crocodiles, also have short, spraddled-out legs. They can stand clear of the ground for short rushes, but most of the time they are belly-crawlers, too. The lizards dart about on their toes a good deal, but squat down and flatten out to rest. It is only when we get clear up into the groups of mammals

and birds that the animals get permanently away from their fish-like belly-posture, with legs stuck out most of the time like fins. True, one has to take account of such things as frogs and toads among the amphibians, and turtles and snakes among the reptiles, but these are plainly highly specialized creatures, as freakish in their own families as kangaroos are among mammals. The important thing is that by sticking to the primitive, presumably ancestral fish-like body-shape in the ascending series, we get also a steady and well-graded series of steps in the evolution of the position and use of the legs.

These are only two examples of many that might be brought forward, but any one that can hunt out others for himself.

Another thing very much worth noticing is that animals all tend to make constant use of parts that are more or less specialized in their own evolution. Thus, birds are always picking up things with their beaks, whether they use them or not. Dogs, with their sensitive noses, are incessantly sniffing. Monkeys are constantly handling things with their hands - and men whittle sticks, tap on their desks with their fingers, scrawl pictures on the telephone pad, and use their hands in a thousand idle ways when they are not working with them. We seem to evolve by playing as well as by working.

III A Natural Explanation

We all know that brothers and sisters look a good deal alike; also that cousins, aunts and uncles resemble each other. Usually, the nearer the kinship the closer the resemblance. The idea thus has become second nature in our thinking, that relatives are alike, and conversely that people who are alike must be relatives. There are any number of old proverbs that spring from this idea: "Like father, like son"; "What is bred in the bone will come out in the flesh".

Having seen this much about ourselves, it is easy to reason that other living things that look alike must also be related to each other. Even before the idea of evolution in its present form took hold, people spoke of lions, tigers and leopards as belonging to the "cat family", and of wheat, oats and barley as members of the "grass family". The great naturalist Linnaeus, though he did not believe in evolution, put men and monkeys together into such a "family". Indeed, these family resemblances are so numerous throughout the living world that it is easier to think them due to a real kinship by common descent, a genuine "blood relationship", than to believe that they came about in any other way.

There is evidence that from the earliest times men must have had some sort of notion of a common bond of kinship among living things. The ancient Egyptians believed that the gods, who were frequently related to men, took up their abode in the bodies of animals. The modern Hindus believe that the souls of men sometimes go into the bodies of animals after death. Savage races in all parts of the world believe that their ancestor-gods were turtles, bears, eagles, and all kinds of animals, and sometimes even plants. Such primitive beliefs as this hint strongly at an original basic idea of the one-ness of all life.

When men began to do deliberate and connected thinking, and work out philosophical systems for themselves, this almost instinctive idea of the kinship

and unity of living things could not help expressing itself.

The idea that the world and everything in it was not made by the Almighty in six days of twenty-four hours each, and that man and the animals and plants were made by some process of gradual unfolding rather than by being moulded out of clay by hand is far older than Darwin. Some of the philosophers of Egypt and Greece and the other ancient lands had ideas about a creation in which a divine power made the earth, planted in it "the seeds of life", and left things to develop according to natural laws.

These ideas were passed on by the Greeks to the early Christians. Saint Augustine, for example, believed in such a process of gradual creation, and not in the six-day, "direct-action" method of making the world, as his writings clearly show. And the great thinkers of the middle ages, particularly St. Thomas Aquinas, found these ideas acceptable also. It was only after the coming of the Reformation that churchmen began to insist on the absolute acceptance of the very letter of the Bible story of the creation. So that really the idea of a six-day creation, now used as a fundamentalist test of right thinking, is not so old in theology as the idea of a creation by evolution.

The modern type of evolution, that is, the development of new species out of old, was thought of by a number of scientists and philosophers during the century before Darwin advanced his famous theory. Among them were the Frenchman Lamarck, the great German poet Goethe (who was an anatomist as well as a poet), and Darwin's own grandfather, Erasmus Darwin, who wrote his theory out in verse, so that nobody took it seriously.

The evolutionary idea was applied to other things than animals and plants before Darwin's time also. In fact, at about the beginning of the nineteenth century the air seemed to be charged with hypotheses of gradual developments instead of sudden creations. For contemporaneous with the early evolutionists was the great geologist Lyell, who taught that the rocks had been formed slowly, through long ages of cooling of an originally molten earth, through the slow deposition of silt and sand by rivers and seas, and through similar processes requiring unimaginable eons of time instead of mere brief days. Somewhat earlier was the astronomer Laplace, who taught that the sun and all the other stars, together with all their planetary systems, had formed through the infinitely slow condensation of the cloudy masses of star-gas or star-dust known as nebulae. Though modified in some important details, the main principles of the evolution of whole universes laid down by these two men are still accepted by scientists. Strangely enough, there has been little or no religious controversy over their theories - possibly because they were not obliged to deal directly with that very important insect, Man.

Thus we see that the idea of evolution itself had a natural origin and went through a process of evolution, and that it was not a "special creation", either by Darwin or any other scientist.

Sweden, the world's largest exporter of softwoods, has only two important woods, pine and spruce, while the United States has nearly a hundred commercial varieties.

LEAD POISONING BLAMED ON HOOCH

Some of the deadly "kick" of many bootleg liquors may be due to lead poisoning as a result of contamination of the liquor with lead from the apparatus used in illegal manufacture. Such is the warning contained in a report by Dr. Joseph Aub and his associates of the Harvard Medical School in a section of their monograph on lead poisoning, which will soon appear in book form.

In his study, Dr. Aub found a number of cases in which there had been no industrial exposure to lead. Investigation disclosed that the poisoning in these cases had been caused by consumption of alcoholic drinks which contained the deadly metal. These beverages were illegally made, presumably with ordinary household appliances.

Samples of eighteen different liquors suspected as possible source of the lead poisoning were analyzed and two only were found not to contain lead. Seven of the samples were distilled liquor and eleven were wines. It was found that in the preparation of one of the distilled liquors a lead worm had been used as a condenser. Lead pipe is frequently used by those engaged in the illegal manufacture of liquor because the lead pipe is easily twisted or turned into almost any desired shape without the use of heat or any special tools.

The lead in the wines is easily accounted for, since the fruit acids, especially tartaric, are excellent solvents for most lead compounds and can easily dissolve it from crocks glazed with a lead glaze, metal vessels containing lead solder, or from copper vessels tinned with inferior tin-lead alloy.

EVERYONE PARTLY CRAZY, SAYS SCIENTIST

"No person is in all respects or at all times normal," says Dr. George W. Henry of the Bloomingdale Hospital at White Plains, New York, in his book, Essentials of Psychiatry, which will appear soon. The average normal person is a theoretical being possessing the average characteristics of a great variety of more or less individuals. Among those included within the limits of the normal group are many who in some respects are definitely abnormal.

To bear out this point, Dr. Henry calls attention to the abnormalities of a number of famous individuals who have commonly been regarded as normal.

Ampere - physicist, mathematician - was unable to express his thoughts unless he walked constantly and kept his body in perpetual motion.

Balzac - novelist - often lived in places unknown to his friends and relatives, believed his writings would reform the world. One evening when he had put on a new dressing gown he wanted to go into the street with a lighted lamp to excite the admiration of the public.

Beethoven - composer - would use several pitchers of ice water to wash his face and hands, splashing it about so that the ceilings below were often stained.

Chopin - composer - during his whole life suffered from extreme nervousness and was tormented by such trifling things as a wrinkle in a rose leaf.

De Quincey - prose writer - was a drug addict and had a psychosis in which he had hallucinations and set fire to his books and papers.

U.S. TO TRAIL ELUSIVE FISH

The United States Bureau of Fisheries has answered the call of exasperated fishermen to do something about the irregular habits of the mackerel, one of the most highly-prized fish in American waters, and it is now initiating plans whereby the mystifying movements of this species can be traced. In some years the fishermen on the North Atlantic coast haul in many tons, and in other years there are hardly any of the fish. Certain localities that are known to be thickly populated by mackerel are suddenly deserted for years. The fish spoil an apparent regular and seasonal migration by bobbing up unexpectedly at both ends of their range at the same time or by appearing simultaneously at a number of places along the coast. O.E. Setto, assistant in charge of the Division of Fishery Industry, has been slated to determine the line of investigation, and is now at Woods Hole, Mass., where a marine biological station is located.

ENGLISH HONOR NAVY ASTRONOMER

The associateship of the Royal Astronomical Society of Great Britain, one of the highest honors that can be conferred on an astronomer, has been given Capt. William S. Eichelberger, of the U.S. Naval Observatory, it has been announced by the superintendent of the observatory. A native of Baltimore, Capt. Eichelberger has been connected with the Observatory since 1898, and since 1910 has been director of the Nautical Almanac, an annual publication giving astronomical information essential to navigators as well as astronomers. In addition the Government Printing Office has just published a catalog of several thousand stars which was prepared under Capt. Eichelberger's direction, and gives their positions, motion, color, and other important scientific data.

AUSTRIAN CARPETS MADE FROM STRING BEANS

A process for making coarse cloth from the fibers of string beans has been patented recently at Budapest, and is being exploited commercially in Austria. The bean shells are treated like hemp, and the fiber that results can be spun, making a hard but very strong yarn. This new material is expected to offer competition to hempen products. It is adaptable for making materials for which cotton has been used heretofore, and it can be used in making carpets, curtains, upholstery, and saddlery after it has been properly bleached and printed.

CHINESE CHILDREN SEMI-FED

Chinese children only get half the calories American children get, but the two nationalities probably have different "normals", says Dr. John Hammond, and Hsia Sheng, after studying the diet and physical development of ninety-six Chinese boys of lower middle class. Height and weight were below American standards. The Chinese diet was very low in protein and fat, and correspondingly