

## True Story of Archimedes

Fresh light on the manner in which Archimedes, the Greek mathematician of the third century B. C., met his death has been brought to light by an early Roman mosaic now in the possession of a noble family in Germany, according to information received by Dr. Ralph V. D. Magoffin, president of the Archaeological Institute of America.

The story of the death of Archimedes is one of the best known tales of classical literature and is one of the stock instances of the eternal combat between ignorant brutality and the search for truth.

"Marcellus, the Roman general," explained Dr. Magoffin, "captured Syracuse in 212 B. C. Some of his soldiers came into a house in the suburbs, where they found a man, whom they ordered to leave. He paid no attention to them. He was engrossed in affairs of his own. He was drawing mathematical designs with a stick in the sand on the floor of his house. One of the soldiers again ordered this queer and inattentive man to get out. As his order was not obeyed, the soldier killed the elderly scientist.

"Cicero and Livy handed down the story about the death of Archimedes with the Latin words *in pulvere describere*, which means drawing figures in the dust. No one of the later commentators seems to have questioned either the mad housekeeping of Archimedes in having so much dust on his floor that he could trace mathematical figures in it with his staff, or the unlikelihood of his having sand on his floor at all. In fact, it is strange that scholars did not jump to the right conclusion before, especially as there was a tip in Apuleius, whose reference in one place to an abacus and sand should have put them on the right track.

"Joseph Napoleon and Joachim Murat, while the French were in power in Naples, conducted considerable excavations at Pompeii and Herculaneum during the years 1806 to 1815. They found a great many good things, the largest part of which were kept in the family, as the sale in 1860 at Rome of the collection of Jerome Bonaparte, after his death, would seem to certify. Among the purchases from that collection was a small mosaic which was acquired by a nobleman from Germany. It is still in the possession of a German countess of the same family in her house

(Just turn the page)



HERBERT SPENCER JENNINGS  
Biologist and Philosopher

Almost every one who ever studied any of the biological sciences at the Johns Hopkins University will tell you, with a brightening reminiscent eye, that the best thing he did there was attend Prof. Jennings' seminar. A seminar is very different from a lecture course, in that the professor listens while everybody else talks (sometimes several at once), but it is very like a lecture course in that the whole atmosphere is still dominated by a single personality.

And the personality of Prof. Jennings makes the atmosphere of his seminar a very favorable one for minds that are moulting their adolescent plumage and preparing for flights of their own. No one can puncture a prejudice more noiselessly and with so little pain. A somewhat shy man himself, no one can more sympathetically induce a shy youth to venture an opinion. Wholly free from cocksureness, he will listen tolerantly to the most dogmatic of declarations; and he knows that gentle ridicule is a far more devastating blast than the most withering winds of scorn.

In the scientific world at large, he figures prominently as a scholar, specializing in the behavior and genetics of animals, particularly of the protozoa. The innumerable cultures of *Paramecium* he nursed during his study of the evolution of these familiar, fantastic creatures have become a matter of proverb.

Prof. Jennings was born in Illinois in 1868. He studied at Michigan, Harvard and Jena, and after "teaching around" for a number of years was called to the Hopkins, where he has been a member of the faculty since 1906.

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## Concerning Sandals

By EDWIN E. SLOSSON

George DuMaurier had the unique distinction among novelists of devising a new attraction for his heroine, a well-shaped foot. Ladies with perfect eyes, noses, teeth, lips, hair, hands and even ears had always been common, at least in fiction, but the idea that one could have a perfect foot so took the world by surprise that the book had an unprecedented sale in the nineties and still finds readers. Everybody except those restrained by their principles fell in love with Trilby.

Now this unique attraction of Trilby's was not due altogether to an exceptional gift of nature, but to the fact that she never had worn shoes. Weissmann's theory that acquired characteristics are not inherited receives additional support in that in spite of artificial deformation of the feet of both sexes by hard and tight shoes for generations, the feet of the newborn are still constructed on the old model. Man's intent has been to make himself a hoof such as the horse has developed out of its digital paws. The horse of the Cretaceous period probably had five toes, soft-padded. His descendant of the present day has a compact bunch of bones bound in by a hard, horny integument. We accomplish the same end when we compress our toes into a rigid shoe.

The purpose is, of course, in both cases to increase the speed and reduce the wear and injury of walking on hard ground. Even the horse's hoof is not hard enough to stand our paved streets and we are obliged to reinforce it with an iron rim. Our tender feet have to have some protection against heat and cold and bruises.

There are two ways of protecting from wear and jar. The covering may be hard and enduring or it may be soft and replaceable. A fort can be protected with granite or with dirt. A wheel can be tired with iron or rubber. The progress of evolution, natural and industrial, has been generally toward the yielding rather than the resisting material. The early animals were encased in shell or scale armor; the later and more successful models have soft flesh and tender skin on the outside. The hoof I have already noted as an exception to this rule. Another is our own foot covering, which has remained of leather, although we have long since

(Just turn the page)

### Concerning Sandals

(Continued from page 169)

discarded leather clothing and hats for lighter and more flexible material.

The Japanese and Chinese seem to have gone a step beyond us in this matter. We really need little or no foot covering in our houses, and for outdoor use the shoe best adapted to the double purpose of leaving the foot in its natural condition and protecting it against the heat, cold or dampness of the pavement, the jolt of the step, and the feet of others, would be an elastic felt shoe about half an inch thick with a waterproof coating. The Chinese shoe is the nearest approach to this, as it is light, soft and thick. But it makes the foot look big, and this objection, being an esthetic one, is invulnerable, so there is no use discussing it.

It is curious how long a piece of apparel remains in use after it has lost its reason for existence. Some of us can remember when boots reaching nearly to the knees were still worn in cities although there were no mudholes or brier patches to wade through. At the present time there is no reason for wearing heavy and high shoes in summer, yet only part of the urban population has adopted the lighter and lower styles. But the movement though slow is continuously in this direction. Shoes get more décolleté every year. This process of dematerialization will go on till there is nothing left of the shoe but its sole. Then we shall have the sandal, which is already coming into use, chiefly it is true for children, but the age limit is rising. Each summer more women adopt them and even an occasional member of the more conservative sex. The sandal is in some circumstances the most satisfactory compromise between hard shoes and barefootedness, for it gives stiffness and protection where it is most needed and yet leaves the foot undeformed and aerated.

Science News-Letter, September 10, 1927

The blue color of the snake's blood is due to copper.

Tuberculosis among Eskimos is prevalent because of crowded conditions in their homes.

A man's hat caught in the ice of a slowly moving glacier took 12 years to travel a mile.

Half the children under one year of age who contract scarlet fever die of the disease.

### GENETICS

### The Lability of Genes

Quotation from PROMETHEUS—H. S. Jennings—Dutton.

Not only what the cell within the body shall become, but what the organism as a whole shall become, is determined not alone by the hereditary materials it contains, but also by the conditions under which those materials operate; or by other materials that may be added later. Under diverse conditions the same set of genes will produce very diverse results. It is not true that a given set of genes must produce just one set of characters and no other. It is not true that because an individual inherits the basis for a set of characteristics, he must have those characteristics. In other words, it is not necessary to have a certain characteristic merely because one "inherits" it. It is not true that what an organism shall become is determined, foreordained, when he gets his supply of chemicals or genes in the germ cells, as the popular writers on eugenics would have us believe. The same set of genes may produce many different results, depending on the conditions under which it operates. True it is that there are limits to this; that from one set of genes under a given environment may come a result that no environment can produce from another set. But this is a matter of limitation, not of fixed and final determination; it leaves open many alternative paths. And even the limitations lose their sharp definition when we contemplate the possibility of introducing other chemicals among those produced by the original genes. Every individual has many sets of "innate" or "hereditary" characters; the conditions under which he develops determine which set he shall bring forth. The characteristics that appear under training are as much inherited characters as those appearing under other conditions; for the conditions help determine the characters in the one case as in the other. These sweeping statements are substantiated by precisely-known facts in many organisms.

Science News-Letter, September 10, 1927

Electric brakes for automobiles are predicted.

Silk culture is being fostered as a new industry in Mexico.

Fountains which sprayed rosewater were a luxury of wealthy Romans.

### True Story of Archimedes

(Continued from page 169)

in Wiesbaden. The antiquity of the mosaic is well attested by archaeologists of authority who put it at the time of the early Roman empire.

"Four birds resembling partridges occupy the four corners of the square mosaic. In the center of the border on each of the four sides is a bowl from which two leaf tendrils extend, one toward the bird in each corner. This beautiful border encloses the Archimedes design which tells the real story of his preoccupation and death. At one side a Roman soldier advances, his drawn sword in his right hand. With his left hand he points behind him toward the door with the gesture that clearly belongs to some such command of 'Begone!' Seated in a broad-backed chair is a bearded man of dignified demeanor who holds the two sides of an abacus, or counting board, on a low three-legged table standing before him. He is working with the abacus, which as is well authenticated, had a compartment on its face next to the lines of counters, on which in sand or dust one might draw figures. The scientist looks up in momentary amazement at the—to him—inexplicable soldier who has burst in so rudely upon him.

"The great Archimedes, then, was killed by a Roman soldier but not while he was standing in a room drawing mathematical designs upon the sand or dust on the floor. He met his end while he was seated in his study with an abacus before him on a table, on which he was originating some new mathematical proposition."

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