

changes that seem to have produced in America the highly specialized modern predecessor, the Eocene *Orohippus*. The line of descent appears to have been direct and the remains now known supply every important intermediate form. It is, of course, impossible to say with certainty through which of the three-toed genera of the Pliocene that lived together, the succession came. It is not impossible that the later species, which appear generically identical, are the descendants of more distinct Pliocene types, as the persistent tendency in all the earlier forms was in the same direction. Considering the remarkable development of the group through the entire Tertiary period, and its existence even later, it seems very strange that none of the species should have survived, and that we are indebted for our present horse to the old world.

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To these four particles there might be added the alpha particle, which is the heart or nucleus of the helium atom, with a mass about four times that of the proton or heart of the hydrogen atom. It is considered to be a unit used in atom building. Prof. G. Gamow, the Soviet authority in atomic structure, says that atomic nuclei are composed of neutrons and alpha particles, with one proton in atomic hearts of odd atomic number.

The photon must have a place in any list of fundamental "particles." It is the unit of light and other electromagnetic radiations, such as X-rays and gamma rays. It is possible to think of light as consisting either of waves or particles, as most convenient at the time. Or under quantum theory and wave mechanics, the newer developments of physics, it is possible to think of the fundamental entities as not waves or particles, but mathematical equations.

How speedily the theory and experimental facts of physics move these days is shown by the opening phrases of a survey of research on neutrons contributed by the Bell Telephone Laboratories physicist, Dr. Karl K. Darrow, to the Review of Scientific Instruments, February, 1933, issued on Friday, Feb. 17: "The discovery of what may prove to be the third and last of the fundamental corpuscles of matter, and what at any rate is a distinctive kind of ionizing ray (neutrons) . . ."

As this was being published came

the cabled news of the enthronement of the positive electron, the fourth fundamental corpuscle.

Negatron or Positron?

When the London correspondent of Science Service cabled the news of the confirmation by the British physicists, the news was specially relayed by telegraph to Dr. Anderson with the suggestion: "Why not christen your new particle 'positron'?"

"With regard to your suggestion," Dr. Anderson wired in reply, "we have already discussed here negatron and positron.

"Historically and derivatively the word, electron, denotes the unit charge, positive or negative, without any reference to the associated mass. The discovery that there exists a positive charge which, like the free negative electron is unassociated with any mass of atomic magnitude, requires the introduction of a new term to distinguish it from the proton which is used to denote the positive electron associated with the mass of the atom of hydrogen. We have been discussing in the laboratory for some months past the desirability of calling the free positive electron, positron, and then using the similar contraction, negatron, for the free negative electron. This makes a logical and systematic notation which should be introduced if and as soon as the existence of the free positive electron becomes established.

"If the observations obtained here, part of which are already published, are actually due to positrons then we have new experimental evidence that in passing through matter positrons lose energy more rapidly than do negatrons."

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PHYSIOLOGY

Secretion From Crustacean Eyes Causes Color Change

RESEARCHES on a melanin-regulating hormone in the eyestalks of crustacea, (SNL, Jan. 7, '33, p. 12) were inadvertently credited to Prof. Lloyd M. Bertholf of Western Maryland University and the University of München, whereas the actual authors of the report were Prof. Earle B. Perkins and Benjamin Kropp of Rutgers University.

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Grapefruit and orange production in the world has increased ten-fold in the past 40 years.

ASTRONOMY

Small Telescopes Reveal Comet Just Reported

A COMET that may become visible to the unaided eye was discovered early Thursday, Feb. 16, in the northern evening sky by Leslie C. Peltier, an amateur astronomer of Delphos, Ohio, the Harvard College Observatory has been informed. It was eighth magnitude and sufficiently bright to be visible through small telescopes or high powered field glasses.

This discovery was confirmed by other observatories.

The comet was observed between the constellations of Cepheus and Cassiopeia in the region of the Milky Way and is moving eastward.

Mr. Peltier is a veteran comet discoverer.

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SURGERY

Grafted Nerves Restore Normal Facial Expression

SIXTEEN patients with hideously twisted, paralyzed faces have had normal expressions and the use of facial muscles restored to them by a newly-improved nerve-grafting operation.

The operation was developed by Dr. Arthur B. Duel of the Manhattan Eye, Ear and Throat Hospital in New York, and Sir Charles Ballance, for many years surgeon-in-chief at St. Thomas' Hospital, London. Dr. Duel has described the operation in a report just published here by the Milbank Memorial Fund which, with the Carnegie Corporation, the Lillia Babbitt Hyde Foundation, the New York Foundation and a number of the surgeons' personal friends, gave the necessary financial support to the research.

In Dr. Duel's opinion, the restoration of facial movements is not only a great boon to a patient's morale in his social contacts, but is also of tremendous importance in making him self-supporting.

The new operation gives the patients the ability to use their facial muscles either voluntarily or in response to their emotions. They can put on a polite, society smile or laugh spontaneously at a funny story. Both factors are important, Dr. Duel pointed out.

Dr. Duel and his collaborator worked first with animals. They found that grafts of nerves from other parts of

ECONOMICS

Soddy Called Money Form of National Debt, Not Wealth

This is the fifth and last article of a series presented to illuminate the backgrounds and objectives of the movement that has found expression in the discussion of Technocracy. The material is given as information and news, not as our opinion or with our endorsement.

THE COMMON idea that money is wealth is combatted by Prof. Frederick Soddy, British Nobel prize winner in chemistry, who in his 1926 book, "Wealth, Virtual Wealth and Debt," looked at economics with the eyes of a physical scientist and enunciated some of the ideas being advanced by Technocracy.

"Money is now a form of national debt," Prof. Soddy wrote, "owned by the individual and owed by the community, exchangeable on demand for wealth by transference to another individual. Its value or purchasing power is not directly determined by any positive or existing quantity of wealth, but by the negative quantity, or deficit of wealth, the ownership and enjoyment of which is voluntarily abstained from without the payment of interest, by the owners of the money, to suit their individual business and domestic affairs and convenience. The aggregate of this deficit is called the Virtual Wealth of the community, and it measures the value of all the money owned by the community, which is forced by the necessity of exchanging its produce to act as though it possessed this amount of wealth more than it actually does possess. The Virtual Wealth of a community is not a physical but an imaginary negative wealth quantity. It does not obey the laws of conservation, but is of psychological origin. It increases with the number of the population and the national income and varies over long periods of time with the habits of the people and the way they conduct their business and domestic monetary affairs. It is only when the Virtual Wealth is constant that the general level of prices is directly, and the purchasing power of money inversely, proportional to the quantity of money in circulation."

If our economic and governmental

affairs were to be ruled by technology and science, Prof. Soddy would make changes in banking and other economic systems. He pointed out that banks create and destroy money arbitrarily without knowing what they do, that they regard themselves as the owners of non-material, negative wealth and lend it and charge interest upon it.

The banks through the operation of the check system, he charged, have usurped the prerogative of the government with regard to the issue of money. In this way, in Prof. Soddy's opinion, the people through their political representatives have abdicated the most important function of government.

Prof. Soddy favored the regulation of total quantity of money in circulation according to the index number of the general price-level.

He also urged that banks should be required by law to keep on hand national money, dollar for dollar, for their customers' deposits, and be allowed to loan only the money deposited with them for that specific purpose and for definite periods.

Debt Said to Be Psychological

When through application of science to economics, it is realized that wealth is physical and debt is psychological, the most astonishing simplifications are produced, Prof. Soddy declared.

"There will, of course, be plenty of people who will argue that the psychological is as important as the physical," Prof. Soddy wrote. "But few will have the hardihood to claim that the understanding of the psychological side can offset crude initial physical misconceptions between wealth and debt and the vulgar perpetual motion fallacy of the older economists. Such errors would have precisely the effect they have already produced in a world administered by and made up of supermen and angels.

"Democracy so far has but seized the shadow and has yet to grasp the substance of sovereignty or be discredited for all time. Its first step must be to end the conspiracy of silence in its organs of publicity and instruction concerning the one prerogative of govern-



Milbank Memorial Fund
RESTORED FACE

A new surgical operation changed the face above, twisted by facial paralysis, into that below. This girl may now smile and laugh with her friends, for she has also been given full control of the formerly helpless muscles.

the animal's body onto the injured facial nerve gave both voluntary control and emotional response of the facial muscles. Earlier methods even at their best are said not to have permitted emotional expression and the voluntary control was made with an effort.

The principles developed in the work with animals have been successfully applied to human cases. Recently Dr. Duel has found a way of shortening materially the time for the graft to "take" after the operation.

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The Braille technique of writing for the blind by means of a raised dot system is now being extended to the representation of line drawings in Braille books.