A very interesting, beautifully illustrated report, discussing the characteristics of coral reefs, nutrition, adaptations of reef-building corals, significances of the Zooxanthellae, effect of light on coral growth, reproduction and development, growth of corals, maintenance of reefs, form of coral reefs, distribution of reef-building corals and evolution of reef-building corals. To this is added an account of the appearance of living coral polyps, by Professor T. A. Stephenson.

This is the sort of book which should be in every university department of zoology. I have been especially struck by an observation, quoted from Hedley, concerning the effects of excessive rainfall on coral reefs in certain localities. It appears that between January 22 and 29, 1918, a total of 35.7 inches of rain fell at Bowen, Queensland, and this coincided with the full moon spring tides. A thick layer of fresh water floated far out on the surface of the sea. When the low tide fell, this surface water sank till the whole reef was immersed in it. Then every living thing that dwelt there—corals, worms, shell-fish and crabs—died immediately. Putrefaction from these enlarged the zone of destruction. This slaughter reached as deep as 10 feet below mean tide level. Crossland describes a similar devastation of corals at Tahiti during exceptional rainfall in January, 1926.

During the past spring, Santa Barbara and adjacent regions were visited by excessive rains, which from the nature of the slopes must have resulted in a great deal of fresh water pouring into the sea. There are no coral reefs, but we may wonder what may have been the effect on the plankton and on the animals of the littoral zone.

John Murray Expedition. Vol. II. No. 5. Chemical and Physical Investigations, by A. F. Mohamed, of the University of Cairo. The pH observations made in the waters of all oceans and seas until 1934 are reviewed, and the detailed observations made in the northwestern Indian Ocean are recorded, with a discussion of the effects of the hydrogen-ion concentration on the life in the sea.

Vol. VI, No. 8. Ostracoda, by H. Graham Cannon. An account of the comparatively few Ostracoda obtained, one of the species being new.

The Francis Walker types of Trichoptera in The British Museum. By Cornelius Betten (Cornell University) and Martin E. Mosely (British Museum). June, 1940. 248 pp. With a portrait of Walker and many illustrations in the text.

Francis Walker was responsible for sixty-eight little volumes published by the British Museum between 1844 and 1873. It is estimated that some 50,000 species of insects were catalogued as being in the collections of the museum, and very many were described as new. It will be readily understood that this work had to be done in a more or less superficial manner to cover so much ground, and later generations have condemned Walker because they could not make out his species from the brief descriptions. In the preface to the present volume it is stated that Walker's catalogues "are an example of the unwisdom of allowing the curatorial needs of museum work to outweigh its scientific standards." Yet it is only fair to recognize that nearly a hundred years ago taxonomic methods were poorly developed in comparison with those of to-day, and even in quite modern times very many species (especially of Lepidoptera) have been described in a manner which would hardly permit their recognition without specimens or illustrations. As the Walker types are nearly all in the British Museum, they are available for study, and the present volume gives a critical account of Walker's species of caddisflies. The treatment is full and exact; of Walker's 101 specific names, 78 are retained, two are found to be preoccupied, and 21 are synonyms. Most of the species are from North America, and the book will be invaluable to all students of American Trichoptera.

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SOCIETIES AND MEETINGS

THE SEVENTH ANNUAL WASHINGTON CONFERENCE OF THEORETICAL PHYSICS, MAY 22–24, 1941

TOPIC

THE topic of the Seventh Washington Conference of Theoretical Physics, May 22 to 24, 1941, was the theory of elementary particles. The elementary particles known at the present time are: The light-quantum; the electron; the proton; the neutron; the positron; the neutrino; and the meson. The rapid development of this field is illustrated by the fact that the last four of these particles were unknown before the last decade. The main subdivisions of the topics discussed at the conference were (1) elementary particles in cosmic rays, (2) elementary particles in nuclei and (3) field theory.

PARTICIPANTS

Sixteen physicists representing eleven universities were invited to act as conveners of the conference. Besides these, eighteen guest-physicists took part, representing twelve universities, government departments and private research organizations. In order to keep the group small enough to make possible

efficient discussion the effort was made to limit attendance, other than the invited conveners, to those whose work is in intimate relation to the topic of the conference.

SCHEDULE

There were three general meetings on the afternoons of May 22 and 24 at the Administration Building of the Carnegie Institution of Washington and on the afternoon of May 23 at the George Washington University. Dr. Fermi at George Washington University gave a lecture at 8 P.M., May 23, on the elementary particles; those participating in the conference, the members of the Washington Colloquium and the general public were invited. During the mornings of May 23 and 24 there were informal discussions in which smaller groups of the conference took part.

SUMMARY OF DISCUSSIONS

The discussion on the afternoon of May 22 was led by Dr. Oppenheimer. The main topic was the theory of the meson. The meson is a particle discovered in the cosmic rays. The meson has a charge which is equal to the charge of the electron and its mass is intermediate between the masses of the electron and the proton. The meson is not present in the cosmic radiation when it arrives at the earth's atmosphere but is created by some collision between the original cosmic-ray particles and constituents of the atmosphere. The meson is not stable but can disintegrate into some other particles whose nature is not yet established definitely. The existence of the meson and its important rôle in the structure of the atomic nucleus have been suspected even before the discovery of this particle in cosmic rays. The main problems discussed concerning the meson were the magnitude of its spin or angular momentum and the value of its magnetic moment. The evidence from the behavior of mesons in cosmic rays makes it highly probable that the value of the angular momentum is zero or one half in the quantum units of angular moments. The magnetic moment is zero if the angular momentum is zero, and there is reason to believe that the magnetic moment is in accordance with Dirac's theory of spinning particles if the angular momentum is one half. It was suggested that the meson may have the angular momentum but that a change in sign would be connected with the reflections of a meson-wave function in space. This means mathematically that the meson is represented by a pseudo scalar rather than a scalar. This assumption has important bearing on the meson-theory of nuclear forces and on the theory of beta-decay.

A further point in this discussion concerned the number of mesons obtainable in a single collision suffered by a cosmic-ray particle. It has been suspected for some time that mesons are created in large batches or showers. At the conference it was suggested that mesons and nuclear particles interact strongly and that this strong interaction may account for the great number of mesons created simultaneously. The interesting part of this explanation is that in spite of the strong interaction there does not result a particularly strong scattering of the mesons by the nuclear particles.

On the second afternoon Dr. Wigner was the leader of the discussion. The discussion centered around the structure of more complex nuclei. These nuclei can absorb electromagnetic waves just as atoms do, but while atoms absorb ordinary or ultraviolet light the radiation absorbed by nuclei is of much shorter wavelength and is called gamma-radiation. The question of most interest about this gamma-radiation arises from its unexpectedly small interaction with nuclei. The interaction is much smaller than one would expect from the rough picture of an oscillating elementary charge which is confined in its motion to the small dimensions (10^{-12} cm) of a nucleus. The possibility was discussed that this simple "dipole" interaction must be replaced by a "quadrupole" interaction arising from the oscillation of several charges whose main effects cancel each other. A second question discussed at the same time was concerned with the decay possibility of the beta-active substances. Nuclei showing beta-activity emit either an electron or a positron and in addition a neutrino. The neutron is a particle whose existence has been postulated to avoid contradictions with the law of energy conservation and other conservation laws. The decay probabilities in the beta-activity depend on the assumptions about angular momenta and other properties that the two ejected particles possess at the moment when leaving the nucleus. It has been attempted to draw some conclusions about these properties from the empirical facts of the beta-decay

The attempt was also made to find systematic relations between the composition of the nuclei and their beta-decay. The beta-decays in the series He^6, B^{10}, C^{10}, C^{14} proved to be particularly difficult to understand. These nuclei consist of an even number of neutrons and an even number of protons. The number of neutron-pairs differs from the number of proton-pairs by $+1$ or -1. In spite of this similarity in structure the beta-decay periods differ so strongly that it seems necessary to assign the He^6 and C^{10} decays to allowed transitions while assuming that the decays of B^{10} and C^{14} are strongly forbidden.

The discussion of the third afternoon session was led by Dr. Weisskopf. The main problem was the nature of the forces represented by various fields

which have been used both in classical physics and in modern theory. If, as it is assumed at present, nuclear forces are due to emission and absorption of mesons by nuclear particles then it is probable that within the nucleus the classical concept of a field of forces must be abandoned. But it was brought out at the conference that even one of the oldest field theories—the theory of electromagnetic fields—is open to serious revision when investigated in small regions of space, particularly when applied in the immediate neighborhood of elementary particles. One of the most radical suggestions that was put forward would abandon completely the concept of a field and would reintroduce instead the idea of interaction of particles at a distance.

The question of artificial-meson production was discussed and here there seems to be some hope of practical results as soon as it becomes possible to bombard nuclei with protons of about 100 million volts. It was found that even at such high bombardment-energies the influence of binding-energies within the nucleus remains important. Artificial production of mesons would probably help very greatly in understanding the nature of elementary particles and of nuclear forces.

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SPECIAL ARTICLES

ON THE HORMONAL ACTIVITY OF A STEROID COMPOUND

EXPERIMENTS on immature adrenalectomized rats have shown that Δ^5-3-hydroxy-21-acetoxy-pregnene-20-one or acetoxy-pregnenolone (A.O.P.), an intermediary product in the Steiger and Reichstein[1] synthesis of desoxycorticosterone acetate (D.C.A.), possesses pronounced corticoid[2] activity. This finding was deemed worth recording, since up to the present no artificial steroid has been shown to possess corticoid potency and A.O.P.—though simpler to manufacture than D.C.A.—has not been assayed for any possible biological activity.

TABLE I

ACTION OF A.O.P. ON ADRENALECTOMIZED RAT*

Treatment	Hemoglobin in g/100 ml of blood	Glucose in mg/100 ml of blood	NaCl in mg/100 ml of blood	N.P.N. in mg/100 ml of blood	Deaths
Oil	14.1	68	410	142	4
A.O.P.	9.0	108	471	82	0
	P=0.02	P=0.02	P=<0.01	P=<0.01	

* All figures in the table represent averages of each group. The significance of the apparent differences between treated and untreated animals was evaluated by "Student's" method for small samples and is expressed in terms of probability estimated by graphic interpolation in Fisher's table of t.[3] It is generally agreed that differences may be regarded as significant if P is smaller than 0.05.

In our first experiment 5 male and 5 female immature albino rats (weighing 35 to 46 g) were treated once daily subcutaneously with 2 mg of A.O.P. in 0.1 ml of peanut oil on 4 consecutive days, their adrenals having been removed on the first day of treatment. They were killed 6 hours after the last injection simultaneously with 5 male and 5 female adrenalectomized controls (weighing 34 to 47 g) treated with 0.1 ml of peanut oil only. The results summarized in Table I clearly indicate that this treatment was beneficial as judged by its ability to maintain life, to prevent the hemoconcentration (detectable by the rise in blood hemoglobin determined with Evelyn's photoelectric colorimeter), the decrease in blood chlorides (expressed as NaCl determined by Van Slyke's method), the hypoglycemia (Schaffer-Hartmann-Somogyi method), and the rise in blood N.P.N. (Folin and Wu method modified for microdetermination with the Evelyn photoelectric colorimeter).

In order to gain quantitative data concerning the corticoid potency of A.O.P. the compound has been assayed in doses ranging down to 120 gamma per day given in two subcutaneous injections to adrenalectomized rats weighing 38 g on the average. It was found to be only slightly less active than D.C.A. as judged by the ability of this dose of the two compounds to maintain life and permit growth in the absence of the suprarenals. The only apparent qualitative difference between the action of the two steroids appears to be that, unlike D.C.A., A.O.P. caused no adrenal cortical atrophy in intact female rats weighing 100 g and receiving 15 mg of the compound subcutaneously on 20 subsequent days.

Similar experiments revealed that 1^5-3-hydroxy-pregnene-20-one likewise possesses corticoid activity.

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[1] M. Steiger and T. Reichstein, *Helvet. chim. Acta*, 20: 1164, 1937.

[2] The term "corticoid" is used here instead of the cumbersome designation "adrenal cortical hormone-like" in accordance with the recently proposed terminology of the steroid hormone actions (H. Selye, *Nature*, in press).

[3] R. A. Fisher, "Statistical Methods for Research Workers," 6th Edition, Edinburgh, 1936, p. 128.