All those in North America should be included in the book who have made contributions to the natural and exact sciences. The standards are expected to be about the same as those of fellowship in the American Association for the Advancement of Science or membership in the national scientific societies which require research work as a qualification.

The compilation of the new edition will of necessity involve much labor; this will be materially lightened if men of science will give the assistance here requested.

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SCIENTIFIC BOOKS

Ancient Hunters and Their Modern Representatives. By W. J. SOLLAS, professor of geology and paleontology in the University of Oxford. Third Edition, Revised. London: Macmillan and Company, 1924.

THOSE who have read the first (1911) and second (1915) editions of "Ancient Hunters" have another treat in store for them in the third edition. The plan of the work remains the same, except for minor details. The number of the chapters and their headings are identical, with the exception of Chapter V, the title of which has been changed from "The Most Ancient Hunters" to "Lower Paleolithic Chellean and Acheulian Ages"; to this chapter the discussion of Piltdown Man and Heidelberg Man has been transferred from Chapter II. At the end of the last chapter there has been added a chronological table, not found in the previous edition.

The chapters have been expanded largely through the addition of new material, so that the reader now has a volume of 689 pages and 368 illustrations, in comparison with 591 pages and 314 illustrations of the second edition. In a perusal of the pages, one notes evidences of revision as well as expansion. For example, his attitude on the subject of eoliths has undergone a change. After a brief study of the Westlake collection from Cantal, Sollas concludes that "in the present state of our knowledge, I think the balance of probabilities distinctly points to the conclusion that these eoliths are the work of an intelligent being."

The large bone implement from Piltdown is referred to the Chellean Epoch and is supposed to be of the same age as the skeletal remains of *Eoanthropus*. The pointed end of a wooden spear found by Hazzledine Warren in a bed containing remains of *Elephas antiquus* at Clacton-on-Sea is thought to be of a somewhat later age, namely, the Lower Acheulian Epoch. Sollas accepts the evidence for a warm stage ushering in the Mousterian Epoch.

Depéret's theories regarding strand-like correlations with glacial phenomena are accepted, which will please some critics and displease others. It will be recalled that Depéret's nomenclature for the old shore lines beginning with the highest are: Sicilian (90 meters), Milazzian (60 m.), Tyrrhenian (30 m.) and Monastirian (20 m.). Sollas would refer *Pithecanthropus* to the Lower Sicilian, *Eoanthropus* to the Lower Tyrrhenian and Neanderthal man to the Lower Monastirian. It is evident therefore that the author has not suppressed his personal opinions on controverted questions; granting that some of these may be wrong, there is much in the book to commend.

The numerous illustrations add materially to the text, although some of the borrowed ones have suffered somewhat in the reproduction process and the sketch map (Figure 106) of the district of Les Eyzies is antiquated.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE METHOD FOR MAKING DIFFERENTIAL COUNTS OF SMALL SPORES

EVERY one who has attempted differential counts of small spores by counting the number of each kind in a field knows how difficult it is to keep from counting the same spores over and over and how tedious the procedure becomes if there are many counts to be made. For many individuals this procedure is subject to considerable experimental error. Incidentally, counting the spores in a field or part of a field and computing therefrom the percentage of each is a slow process. The following method requires two persons, an observer and a recorder, but is very rapid and eliminates some of the experimental error. Select a thin round cover glass and with India ink rule across it two parallel lines a millimeter or less apart. In the middle of the cover draw a third line perpendicular to and joining the first two, thus forming a narrow letter H in the center of the cover. Drop the cover onto the "stop" of an ordinary 10 X eyepiece as though inserting a micrometer disc. Such a cover, unlike an ordinary micrometer disc, does not perceptibly interfere with definition, a factor of importance when observing hyalin spores. Place the slide, which should be prepared so as to give a fairly uniform distribution of spores, in position on a mechanical stage having convenient right and left movement. Arrange the eyepiece containing the cover slip so that the parallel lines coincide with the right and left movement of the stage. With a 3 or 4 mm lens, select, in the region well to the left of the center

of the preparation, a field showing abundant spores. Suppose there are five kinds of spores in the mount; assign a letter to each kind. Move the slide from left to right so that the spores appear to be slowly travelling along between the two lines. Call off to an assistant the proper letter for each spore passing by the vertical line within the parallel lines. Let the assistant record the letters on plotting paper conveniently divided off into 50 or 100 squares. This method will enable a record to be made almost as fast as one can talk. Of course, simply counting the letters will give the percentage of each type of spore. This procedure will obviously eliminate some of the experimental error common in "field counts," and is much faster since there is no pause to answer the question, "Have I counted that one before?" The writer is using the method in studying a species of Fusarium.

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CULTURE MEDIUM FOR THE CILIATE LACRYMARIA

LACRYMARIA has been observed by numerous biologists who noted its form and structures, "its phenomenal power of elongation, its wonderful elasticity and its great freedom of movement,"[1] but no one has as yet made a thorough study of this remarkable organism. This is no doubt due to its scarcity.

Mast, who has had wide experience in collecting protozoa, says ('11, p. 230): "Lacrymaria is relatively scarce in nature. It is occasionally found in cultures containing decaying aquatic plants but never in great numbers. One rarely finds more than two or three specimens in a drop of solution." And no one has heretofore succeeded in cultivating it in the laboratory. Professor Mast called my attention to this and suggested the following experiments:

Various concentrations of (1) timothy hay, (2) wheat, (2) beef extract and (4) malted milk in distilled water were prepared in two sets, one of which was boiled and the other not. All were seeded with Lacrymaria and examined from time to time for several weeks.

The Lacrymaria died out, without any apparent increase in numbers, in all the cultures except those containing malted milk, 1–5 mgr to 100 cc water. The best growth was obtained in cultures containing 3 mgr malted milk to 100 cc water. In some of these the Lacrymaria became very abundant and continued to thrive for more than six weeks without adding anything to the cultures.

These cultures contained Halteria and another similar organism which was not identified and numerous bacteria. The Lacrymaria were observed to capture Halteria, but they appeared to feed mostly on the other organisms.

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[1] Mast, 1911, "Habits and Reactions of the Ciliate Lacrymaria," *Journ. Animal Behavior*, Vol. 1, pp. 229–243.

SPECIAL ARTICLES

A PRELIMINARY REPORT ON THE CULTIVATION OF THE MICROBE OF OROYA FEVER

OROYA fever, or Carrion's disease, is a highly fatal infection endemic in certain regions of Peru. Its most striking clinical feature is a rapidly progressing severe anemia, associated with febrile reactions. In the red blood cells of patients suffering from the disease Barton found, in 1905, peculiar bacilliform elements, the specificity of which has been confirmed by Barton's subsequent observations and those of later investigators. Strong, Tyzzer, Sellards, Brues and Gastiaburu concluded that these bodies are of protozoan nature and proposed for them the name of *Bartonella bacilliformis*. Their cultivation, however, had not been achieved, and the problem offered opportunity for the trial of procedures recently developed for the cultivation of certain spirochetes, flagellates and rickettsia-like microorganisms.

In the summer of 1925 one of us (B.) went to Lima and secured the material for study. Through the generous permission of Dr. Olaechea, of the Dos de Mayo Hospital, Lima, blood was withdrawn into citrate solution from a case of oroya fever and brought to the Rockefeller Institute, where the cultural and experimental work has been carried out.

Of the various media employed, including those which had been found suitable for the cultivation of anaerobic treponemata, as well as aerobic media used for the cultivation of the leptospiras, flagellates and rickettsia-like microorganisms, only the aerobic media, solid or semisolid, containing blood or serum yielded growth of *Bartonella bacilliformis*. The initial cultures were obtained both on leptospira medium and on blood agar slants (20 to 30 per cent. of defibrinated horse blood) containing certain carbohydrates. The organism grew in pure condition on the first attempt, and pure cultures have been repeatedly obtained from the original citrated blood. Growth occurred at 37° C. and also at 28° C. within 48 to 72 hours. Subcultures were readily obtained on similar media, and the strain has been maintained in the laboratory since the beginning of October, 1925.