are not more than 50 feet deep, and none has yet been proved to continue below 300 to 500 feet. The future of manganese mining is limited by some of the same factors as iron mining, owing to the limited range of the ordinary oxide ores. The mines are still open quarries, from which the ore can be very cheaply produced. Mr. Fermor's monograph concludes with a comparatively elementary statement regarding the methods of mining and the economics of the industry. More precise information as to labour costs and efficiency would have been of interest. The rates of pay are from 2½ to 7 annas a day for men, 1½ to 4 annas for women, and from 1 to 3 annas for children; the efficiency must be very low if it may be judged by dividing the annual output of the different mines by the number of people recorded as engaged in them. The native miners appear to insist on more holidays than Welsh colliers, without having the same excuse.

Owing to the present great activity in Indian manganese mining, the known deposits there cannot last very long. Mr. Fermor in 1907 estimated that the supplies would be worked out in from thirty to fifty years. Now, in spite of some additional discoveries of ore, he is disposed to reduce even that short limit; and he earnestly warns India that it is adopting a wasteful policy in the reckless export of manganese, which will have to be purchased from other countries for the manufacture of ferro-manganese when India works its enormous supplies of iron ores. Owing to the possibility, however, of the discovery of fresh deposits and of the invention of new processes that may supplant manganese, it is not proposed to impose legal restrictions on the export of the ore. J. W. G.

THE STRUCTURE OF CRETACEOUS PLANTS.

HITHERTO our knowledge of the structure, as distinguished from the mere external appearance, of Mesozoic plants has been for the most part limited to the older floras, in which only the earlier types, such as ferns, cycadophytes and conifers, are represented. From the Upper Cretaceous, the epoch when the now dominant angiosperms first overspread the world, little structural material has been available until lately, if we except the petrified wood of palms, which has long been known and is of the utmost interest.

At the present time new facts of great value are coming in from two principal sources—from the researches of Drs. Hollick and Jeffrey on the lignites of the eastern United States, and from the work of the authors below cited on the petrifications from northern Japan.

The specimens described in the present paper, which must be regarded as only a first instalment of the work, were among those collected by Miss Stopes on her recent expedition, undertaken with the assistance of a grant from the Royal Society, and helped in every possible way by the Government and universities of Japan. Eighteen types are described—not a large number, but quite enough to make a good beginning. The number of species with structure preserved is not very large, even in the best known fossil floras. We think, however, that the authors in their comparison somewhat underestimate the richness of the English Carboniferous flora in admitting only about seventy structural species; 100 would be nearer the mark.

The flora investigated is a mixed one, the eighteen species including one fungus, three ferns, eight gymnosperms, and six angiosperms; such proportions are quite unusual, the angiosperms commonly being dominant if they appear at all.

Only a few of the most important forms can be referred to here. Among the ferns, *Schizaeopteris mesozoica* bears the characteristic sporangia of Schizæaceæ, Aneimia being the nearest genus. Of the gymnosperms, *Niponophyllum cordaitiforme* may be either a leaf or a leaflet; if the former, it may be a belated member of the ancient Cordaiteæ; if the latter, it may be akin to the Bennettiteæ.

Yezonia vulgaris, with a cypress-like habit, has a very peculiar structure, the small adpressed leaves containing numerous vascular bundles. If, as there is reason to suspect, the cone *Yezostrobus Oliveri* was its fruit, the plant appears to represent a type intermediate in certain respects between Cycadophyta and Coniferæ.

Cunninghamiostrobus yubariensis shows a clear affinity with the recent Cunninghamia, while *Cryptomeriopsis antiqua*, so far as vegetative characters can decide, comes near the familiar Cryptomeria of modern Japan.

Among the fossils referred to angiosperms, *Saururopsis niponensis* shows an anatomical structure similar in some ways to that of Saururus, an ally of the peppers. Some readers may perhaps ask if it is quite certain that this plant is an angiosperm, and may even think of a possible comparison with Ophioglossaceæ. In the meantime, the authors' suggestion is at any rate tenable. It is interesting that the commonest angiosperm in these rocks, *Sabiocaulis Sakuraii*, appears to show the nearest affinity with the native climbing plant *Sabia japonica*.

The most sensational discovery, however, is that of a three-celled ovary of the type of Liliaceæ, for this is the first case in which any angiospermous fructification has been found fossil with its structure preserved. A perianth or bract is adherent to the lower portion of the ovary, making it partly inferior. It is curious, if somewhat disappointing, to find that this ancient flower appears to have been already so advanced as to give no clue to its ancestry.

In many cases diagrammatic text-figures are used very advantageously to supplement the photographs (sometimes a little obscure) which form the bulk of the illustrations.

The authors' concluding remarks suitably sum up the results so far attained:—"These new fossil plants, then, seem to be an interesting community, consisting of a mixture of old and new types, of higher and lower plants mixed in nicely balanced proportions: a community, which in some respects, at any rate, one could have hardly imagined from the fossil remains hitherto available from the Epoch."

[1] "Studies on the Structure and Affinities of Cretaceous Plants." By Dr. Marie C. Stopes and Prof. K. Fujii. Phil. Trans. Royal Society, Series B. vol. cci. Pp. 90; plates 9. (Royal Society, 1910.)

ARCHÆOLOGICAL AND ANTHROPOLOGICAL INVESTIGATIONS IN ARKANSAS AND LOUISIANA.[1]

MR. CLARENCE B. MOORE in 1908–9 investigated the mounds and cemeteries of the valley of the Ouachita, a river that rises in central western Arkansas and flows south-easterly into the State of Louisiana; its lower course is the Black River, which joins the Red River, a tributary of the Mississippi. The more striking remains are earthenware vessels of very varied forms and different colours. The most common form of decoration consists of the original surface of the vessel being left in scroll bands and round or oval discs, the interspaces being generally filled up with parallel lines or cross-hatching. The accompanying figure illustrates a superb bottle, 8¼ inches in height, which has a coating of red pigment of superior quality, through which is incised a beautiful combination of discs and running scrolls in a field of parallel lines which emphasise the design; possibly the incised lines were accentuated with white pigment, but no trace of this remains. The technique of some of the vessels from Glendora is superior to anything of the kind hitherto met with outside the Lower Mississippi region.

The excavations were confined almost entirely to land that was, or had been, under cultivation. When the aborigines selected dwelling sites along rivers subject to overflow, they naturally chose high ground; and later, when Europeans selected land to clear for cultivation, they were similarly influenced, especially as much of this land had been enriched by aboriginal deposits. It is needless to say that the report is illustrated in that sumptuous manner which characterises Mr. Moore's publications.

The value of the memoir is enhanced by a very careful study, by Dr. Aleš Hrdlička, of the skeletal remains discovered by Mr. Moore. This constitutes a welcome contribution to the craniology and osteology of the American Indian, and we hope it will be followed by similar studies by the same anatomist. Dr. Hrdlička, in an attempt to determine the amount of prognathism, made use of the

[1] "Antiquities of the Ouachita Valley." By Clarence B. Moore (Journal of the Academy of Natural Sciences of Philadelphia, 2nd series, vol. xiv. part i., 1909).

basi-facial angle, a measurement which was independently arrived at by Dr. Rivet (*L'Anthropologie*, xx., 1909, pp. 35, 175). The majority of the crania exhibit one of the two main forms of artificial deformation, *i.e.* occipital flattening, or cradle-board compression, and fronto-occipital flattening ("flat-head" deformation). Each variety predominates in, but is not limited to, a certain type of people, thus indicating an exchange of customs.

The predominating type is that of the brachycephals, who range in stature from moderate to well developed, with good, though not pronounced, muscular development. They were probably the people among whom prevailed, and who communicated to their neighbours, the intentional fronto-occipital deformation. The other type, less well represented, indicates Indians of stature and strength similar to those of the people just mentioned, but with oblong, mesocephalic to dolichocephalic skulls. They were, in all probability, remnants of a relatively large local strain of dolichocephals mixed with the more numerous round-headed people. The physical characters of these people approach, on the one hand, those of the more northerly tribes of Missouri, Illinois, and parts of Tennessee and Kentucky, and, on the other, those of the more westerly and south-westerly tribes, represented in northern Texas

Bottle from Glendora, Ouachita Valley, La.

and especially by the oblong-headed type among the Pueblo Indians. The prevalent occipital flattening of the skull would point likewise to a connection with the south-west and the north-east. In addition, a few crania from these two States resemble very closely the subtype of the eastern Algonquians.

A. C. HADDON.

THE TABULATION OF VITAL STATISTICS.

ATTENTION has so often been directed in these columns to the desirability of the adoption of more scientific methods in our Government departments that it gives us pleasure to notice the paper which was read by Dr. T. H. C. Stevenson before the Royal Statistical Society on June 21. Dr. Stevenson was appointed last year Superintendent of Statistics in the General Register Office for England and Wales, and his paper on suggested lines of advance in English vital statistics is, in effect, an outline of all the changes which it is proposed shortly to introduce in the mode of compilation of the vital statistics issued from that office, and of the mode in which it is proposed to compile certain tables in the census reports, more especially those relating to the new data to be obtained in 1911 (see NATURE for April 7, p. 152).

That a civil servant should, with the approval of his official superiors, submit for criticism to a scientific society, before their final adoption, a statement of changes which it is proposed to introduce is, we believe, a course wholly without precedent, and deserves the warmest commendation. Taken in conjunction with the acceptance by the Registrar General, Mr. Bernard Mallet, of many of the suggestions made by the Statistical Society for the improvement of the census, the course augurs well for the thoroughly scientific spirit in which his office will be conducted.

The matter of Dr. Stevenson's paper is too detailed for abstraction in these columns, but it may be noted that it is intended in future to tabulate vital statistics by administrative instead of by registration districts, and that the data as to number of children which will be obtained at the next census will be tabulated, not only for different occupations of father, as suggested in the article in this journal to which reference is made above, but also by the number of rooms occupied or the number of servants employed, so as more clearly to distinguish the different social strata. It is also proposed to introduce the card-system for vital statistics and for census work, and to use mechanical methods for sorting and counting the cards. The frankness with which Dr. Stevenson points out difficulties and asks for suggestions is one of the most pleasing features of a paper on which he can be unreservedly congratulated.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

ENTRANCE scholarships have been awarded at Bedford College for Women (University of London), as follows:—Pfeiffer scholarship in science (value 50*l.* a year for three years) to Miss W. R. Smyth, of the North London Collegiate School; Henry Tate scholarship in science (value 50*l.* a year for three years) to Miss F. M. Lunniss, of the Cambridge and County School.

WITH the view of securing uniformity in the statistics concerning higher education, the Carnegie Foundation for the Advancement of Teaching has issued, as Bulletin No. 3, a series of standard forms for financial reports of colleges, universities, and technical schools. The forms as they are published are the result of a prolonged inquiry concerning the practice of universities and colleges in the United States in the rendering of public financial statements of their receipts and expenditures. The object of the forms is to make it easy for students of education and others to answer the questions, What is the total income of a given institution for the year? What is its annual expenditure? What are the assets at the end of the year? The forms may be commended to the attention of officials who are responsible for preparing balance sheets and other statistics in connection with universities and colleges in this country.

MR. SIDNEY BALL, fellow and senior tutor of St. John's College, Oxford, and Prof. I. Gollancz, professor of English at King's College, London, have been elected the first fellows of the English foundation of the A.K. travelling scholarships. It may be remembered that these fellowships, each of the value of 660*l.*, were recently founded in this country by Mr. Albert Kahn, of Paris, to enable the fellows to travel round the world. The object of the founder is that persons selected from the first rank of those engaged, in whatever way, in the education of the nation may become better qualified to teach and to take part in the instruction and education of their fellow-countrymen. The trustees are the Lord Chancellor, the Lord Chief Justice, the Speaker, Lord Avebury (nominated by the founder), and the principal of the University of London (Dr. Miers), the last-mentioned being honorary secretary to the trustees. The affairs of the trust are administered at the University of London.

THE current issue of the *Reading University College Review* contains several articles of interest. An editorial