

in the grotto of the Arene Candide. Another very close parallel is afforded by the cusped bone instrument represented (Fig. 5), which the Rev. J. E. Somerville, of Mentone, obtained from the neighbourhood of one of the last discovered skeletons of the Barma Grande. Though blunter and thicker, it greatly resembles some of the bone arrow-heads from the Neolithic burial-place in the Arene Candide cave.

Of all the bone objects, however, discovered with the present interments the most interesting are those already referred to as

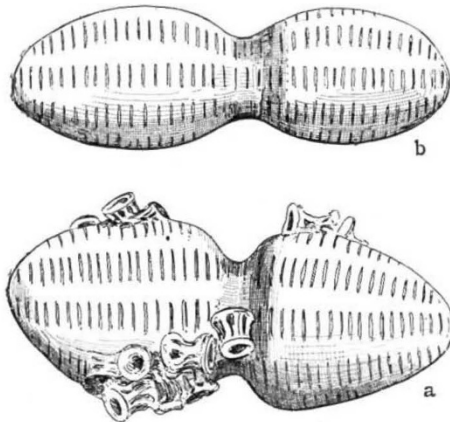


FIG. 6.—Bone ornaments, (a) with fish-vertebrae adhering.

resembling two small eggs, or acorns, with their big ends united with a connecting stem. The bossy part of these ornaments was decorated with rows of parallel lines running up the sides like the rungs of so many ladders. Seven or eight of these are said to have occurred in all, but, like other relics found, most of them have since disappeared. The shape of different specimens varied slightly, some being more elongated than others.

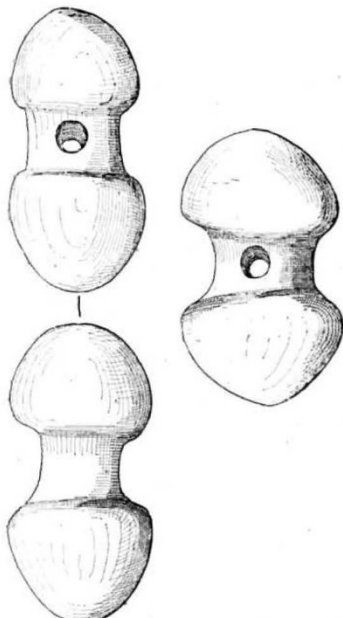


FIG. 7.—Scandinavian amber beads.

But what at once struck me on seeing these objects was the great resemblance they presented to certain amber ornaments discovered with early Neolithic skeletons in the galleried tombs of Scandinavia and North Germany. The objects in question are certain double-bossed ornaments of amber, in Scandinavia generally known as "hammer-shaped" beads, and which, from their supposed resemblance to the stone-hammers of the same period, have been by many supposed to have been worn as amulets. (Fig. 7.)

The geometrical system of ornamentation on the bone ornaments from the Mentone Cave seems to be foreign to that found on bone and horn relics of the "Reindeer Period." On the other hand, like the bone ornaments themselves on which it occurs, it presents the closest analogy to a style of decoration very characteristic of the Later Stone Age in Northern Europe.

The conclusion, then, to which we are led by these converging lines of evidence is that the interments of the Barma Grande and the other caves of the Balzi Rossi cliffs, though embedded in a Palæolithic stratum, are themselves of Neolithic date. On the other hand, however, the entire absence of pottery, of polished implements, of remains of domestic animals, as compared with the abundance of all these features in the Neolithic interments of the Finale Caves further up the same Ligurian coast, is on any showing a most remarkable phenomenon. A greater degree of petrification is also observable in the bone and other objects discovered. *In all probability, therefore, we have here to deal with an earlier Neolithic stratum than any of which we have hitherto possessed authentic records.* If the evidence of these Balzi Rossi interments is to count for anything, it must henceforth be recognised that a race representing the essential features of the later population of the polished Stone Age was already settled on the Ligurian shores of the Mediterranean at a time when many of the civilised arts, which have hitherto been considered as the original possession of Neolithic Man on his first appearance in Europe, were unknown. It will no longer be allowable to say that these supposed immigrants from Asia brought with them at their first coming certain domestic animals, and had already attained a knowledge of the potter's art, and of the polishing of stone weapons. And, if this is the case, something at least will have been done towards bridging the gap between the earlier and later Stone Age in Europe. Till such time, however, as remains of extinct animals are found in such association with human interments as to prove their contemporaneity we must still allow for a vast interval of years between the latest remains of the "Reindeer Period" and interments, such as those of the Mentone Caves.

The racial characteristics of the skeletons of the Balzi Rossi, while linking them at one end with the later Neolithic occupants of the Finalese, show that they had essentially the same physical type as the early skeletons found in Cro Magnon Cave with very similar ornaments of bored shells and teeth. The same features occur again in the skeletons from the Neolithic grotto of the Homme Mort, in Lozère, and in some of the French dolmens, as that of Vignettes. The type recurs East of the Apennines and in Central Italy, Sicily, and Sardinia; and the field of comparison extends to Southern Spain and the Canaries.

The physical connection with the Dolmen people derives additional interest from the comparisons established between the bone ornaments found with the Barma Grande skeletons and the amber hammer-beads of the Scandinavian Gallery Graves, and the decorative system of the pottery found in the same. It looks as if in the polished Stone Age the Neolithic settlers in the North of Europe had transferred to the new materials, such as amber and earthenware, forms and ornamentation which had already been an ancient possession of a race settled on European soil in still more primitive times.

Two shells found with the Balzi Rossi interments, *Pecten maximus* and *Cypræa millefucata*, seem to point to Atlantic connexions. In the later Neolithic interments of the Finalese, on the other hand, which may represent the same race in a more advanced stage of development, we see new influences coming in from a very different direction. Some of the shells found with these seem to have been derived from the Southern Mediterranean, and one, the *Mitra oleacea*, found by Prof. Issel in Caverna della Arene Candide, must have made its way by some primitive line of intertribal barter from the Indian Ocean.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. Theodore J Pocock, of Corpus Christi College, has been elected to the Burdett-Coutts Scholarship in Geology. For the Merton Biological Fellowship a strong list of candidates is reported, including among others Mes-rs. F. E. Beddard, M. S. Pembrey, E. A. Minchin, P. C. Mitchell, and R. T. Günther.

As the result of a memorial addressed to them by the demonstrators in the various departments of Natural Science, the Hebdomedal Council have appointed a committee, consisting of Mr. T. Raleigh, of All Souls, and Mr. T. H. Grose, of Queen's College, to inquire into the position and status of the demonstrators at the museum.

CAMBRIDGE.—Dr. Forsyth has been appointed chairman of the Examiners for the Mathematical Tripos, Part II., and Mr. Welsh, of Jesus College, for Part I.

Prof. Ramsay, of University College, London, has been elected Examiner in Chemistry for the Natural Sciences Tripos.

At St. John's College, Mr. E. W. Macbride, Hutchinson Research Student, and University Demonstrator in Animal Morphology, has been elected to a Fellowship. Mr. Macbride took a first class in both parts of the Natural Sciences Tripos (zoology and botany) in 1890-91, and is the author of various morphological papers based on researches conducted in Cambridge and at the Zoological Station at Naples. He has been President of the Union Society, and is well known as a vigorous debater. At the competition for Fellowships on this occasion there were no less than seven candidates in Natural Science, who had all taken first class honours in the Tripos as students of St. John's.

SCIENTIFIC SERIALS.

Wiedemann's Annalen der Physik und Chemie, No. 10.—On air vibrations, by A. Raps. The changes of density at the nodes of open and closed organ pipes were recorded by allowing a beam of strong white light to fall upon the mirror of a Jamin interference refractor. One of the reflected beams was sent through a pipe at the node, the other through a box containing undisturbed air. After reunion by the second mirror, these two beams gave rise to interference fringes, which were displaced during the changes of density accompanying the sound of the pipe. A section across these fringes, consisting of bright and dark points, was received upon a revolving drum carrying sensitive paper, and the oscillation of the points gave rise to a series of curves representing the sound vibrations with very fair accuracy. A series of eighty-eight photographs are reproduced, which give valuable hints concerning the structure of the various notes, and also some vowels and consonants produced in the open air.—Luminous phenomena in electrode-less vacuum tubes under the influence of rapidly alternating electric fields, by H. Ebert and E. Wiedemann. This paper, a sequel to the general investigation published in No. 9, deals with the details of the phenomena observed between the condenser plates of a Lecher wire system in the case of spheres, cylinders of various lengths, coaxial double cylinders, and glass parallelepipeds with plane ends.—Heat of dissociation in electro-chemical theory, by H. Ebert. Calculations based upon heat of dissociation and electrolytic work show that the forces of chemical affinity are chiefly of an electric nature, that the forces due to "valency-charges" are the most powerful of any atomic forces, and that any additional chemical forces are, in comparison, infinitesimal.—Equipotential lines and magnetic lines of force, by E. von Lommel. Some further photographic tracings of these lines are given, and their bearing upon the Hall effect is discussed.—Objective representation of interference phenomena in spectrum colours, by the same author. Simple arrangements are described for exhibiting Newton's rings, gypsum fringes, convergent polarised light phenomena, and fringes produced by the rotation of the plane of polarisation in quartz prisms, upon a screen. For Newton's rings the light from the heliostat is reflected by a colour plate, and falls upon a lens which produces an image of the sun at its focus. By placing a slit at this focus and a prism between slit and lens, the rings in all the spectrum colours may be thrown upon the screen by shifting the slit.—Papers by Kayser and Kunge, P. Czermak, and R. J. Holland have already been mentioned.

THE pages of the *Botanical Gazette* for September contain but little except reports of the proceedings of the Botanical Section of the Madison meeting of the American Association for the Advancement of Science, of the Madison meeting of the Botanical Club, and of the Madison Botanical Congress. That for October contains several important papers:—On the fructification of *Juniperus*, by Mr. J. C. Jack, who states that in America the fruit of the English species of juniper does not

mature until the autumn of the third year after blossoming; on the development of the embryo-sac of *Acer rubrum*, by Mr. D. E. Mottier; on the achenial hairs of *Compositæ*, by Miss M. A. Nichols; and on the bacterial flora of the Atlantic Ocean in the vicinity of Woods Holl, Mass., by Mr. H. L. Russell. The results obtained by the author accord in a general way with those previously made in the Mediterranean. While the water and underlying sea-flow are filled with bacterial life, they are by no means in an entirely quiescent condition. Both water and mud are peopled with micro-organisms which are undergoing their cycle of development here as elsewhere.

THE Nos. of the *Journal of Botany* for October and November are almost entirely occupied by papers on local and descriptive botany, including the completion of Mr. E. G. Baker's synopsis of Geneva and species of *Malvææ*, and a sketch of the botany of Ireland, by Mr. A. G. More.

THE summer number of the *Fahrbuch* (Austrian Geological Survey) contains contributions by Drs. Emil Tietze, von Wöhrmann, Bittner, Skuphos, and others. Dr. Emil Tietze writes on the "Geology of the Ostrau District." Great hopes were raised in this neighbourhood by the discovery of coal near Wagstadt, in the Upper Oder valley, but Dr. Tietze informs us that the coal occurs only locally and in mere fragments. With regard to the age of the Ostrau beds, he argues that they should be grouped with the upper and not with the lower carboniferous series. They rest unconformably on the Culm grits and shales and are conformably succeeded by the Schatzlar beds, a deposit closely resembling the Ostrau beds in general character. Another paper by Dr. Tietze discusses the prospects of the salt industry in East Galicia.—Baron v. Wöhrmann contributes an article on the "Systematic Position of the Trigonidæ and the Descent of the Nayadidæ." He shows that both the Trigonidæ and the Nayadidæ have true heterodont hinges, and that therefore the classification into schizodont and heterodont bivalves suggested by Neumayr cannot be carried out. Taking the fresh-water bivalve *Unio* as type-form of the Nayadidæ, v. Wöhrmann traces the phylogenetic relationship of this family with the genus *Trigonodus* (Up. Triassic shore deposits), and through *Trigonodus* with the ancient ancestral type, *Myophoria* (Devonian to Rhætic).—Dr. Theodor Skuphos completes his survey of the Partnach beds in the Northern Alps. He found in the Vorarlberg deposits of this age a new fossil Saurian, which he names *Partanosaurus Zitteli*. Dr. Skuphos thinks it probable that this Saurian is identical with certain remains found in extra-alpine deposits of Upper Muschelkalk age in Würtemberg.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, October 27.—Prof. J. Perry, F.R.S., vice-president, in the chair.—Mr. E. C. Rimington read a paper "On the Behaviour of an Air-Core Transformer when the Frequency is Below a certain Critical Value." Taking the ordinary differential equations for two circuits having self and mutual induction, and assuming sinusoidal E.M.F.'s and constant coefficients, the author shows that although the difference of phase between the primary P.D. and primary current is always diminished on closing the secondary circuit, yet under certain circumstances this closing increases the impedance of the primary. With constant P.D. this means that closing the secondary decreases the primary current, a phenomenon not usually observed. The critical conditions necessary for increased impedance are fully worked out in the paper, as well as those under which this increase becomes a maximum. In the case of two identical coils with no magnetic leakage, the critical value of α ($\alpha = \frac{\rho L}{r_1}$ where $\rho = 2\pi$ times the frequency, L the inductance of the primary, and r_1 its resistance) is $\sqrt{2}$, whilst that to give maximum impedance is $\frac{1}{\sqrt{2}}$. The maximum increase possible is $15\frac{1}{2}$ per cent. The corresponding values are given for various amounts of magnetic leakage in tabular form, and curves were exhibited at the meeting showing how the impedance, current, power, and magnetising effect vary for different values of α . To test his conclusions the author made experiments on two coils close together, the observed increase in impedance amounting to 3.2 per cent. In addition to the analytical