Hudson brings forward evidence, which appears to be quite conclusive, that the interpretation of this point as marking the decomposition of the $\beta$ phase of brass into $\alpha+\gamma$, which has been elaborated by Prof. Carpenter in a series of papers, is erroneous, and that the $\beta$ phase merely undergoes a polymorphic change from $\beta$ to $\beta_1$. A striking method of proof adopted by Mr. Hudson is that of preparing a series of alloys in a single piece of metal by the method of superposition. By superposing molten zinc on a layer of solid copper, the alloys can be formed at a temperature below 460° C., and yet a phase which corresponds to $\beta$ makes its appearance. If what Carpenter has called "apparent $\beta$" were really unstable below 460° C., it could never be produced synthetically below that temperature.

Equally interesting from another point of view is the paper, and resulting discussion, by Mr. Arnold Philip dealing with the causes of corrosion in condenser tubes. In the recent Report to the Corrosion Committee of the Institute of Metals, Dr. Bengough and Mr. Jones had been led to reject entirely the view that particles of foreign matter, such as coke, which might set up local electrolytic effects, could thereby accelerate local corrosion and produce "pitting." Mr. Philip traverses this conclusion, and suggests that it was reached on insufficient evidence, while he adduces positive evidence to show that particles of coke can cause local pitting. While such divergence of views among those studying these matters is somewhat unfortunate from the point of view of the practical man seeking guidance for his practice, it serves to show the great need which exists for the further exhaustive investigation of such fundamental questions, and at the same time demonstrates the useful work of the Institute of Metals in encouraging such work and providing a meeting ground for full and—fortunately—dispassionate discussion.

Further papers of special scientific interest are those by Mr. S. W. Smith on the surface tension of molten metals, by Mr. Phelps on the effect of hydrogen on the annealing of gold, and by Messrs. Bengough and Hanson on the tensile properties of copper at high temperatures. In a "Note" Prof. Huntington also deals with the tensile properties of metals at high temperatures, but while Bengough and Hanson find in their results strong support for the theory that the crystals of a metal are held together by something of the nature of an amorphous cement, Huntington urges somewhat vague objections to that view.

Another "Note," contributed by Prof. Carpenter, deals with "The Extraction of Native Copper at Calumet, Lake Superior"; while in itself not uninteresting, it is difficult to understand why this note has been included in the Journal of the Institute of Metals, since it deals with a subject outside the scope of its work and coming well within that of the Institution of Mining and Metallurgy. Although unimportant in itself, such a departure from accepted limitations causes confusion when references have to be looked up.

## RECENT WORK ON INVERTEBRATES.

THE journal of a college of agriculture is about the last kind of periodical in which we should expect to find descriptions of deep-sea cephalopods. Nevertheless, three out of the four articles constituting the contents of the seventh number of vol. iv. of the Journal of the College of Agriculture, Imperial University of Tokyo, are devoted to new and rare species of squids, the remaining communication dealing with the eels of the Japanese, Corean, and Formosan seas. In the first of the three articles on squids, all of which are very fully illustrated, Mr. C. Ishikawa describes a new species of the genus Enoploteuthis from the Japan Sea, while in the second Messrs. Ishikawa and Wakiya treat of a number of fragments of a gigantic species taken from the stomach of a sperm-whale. The latter is identified with *Moroteuthis robusta*, of which it forms the fifth known example; in the third article the last-named writers describe a new species of the same genus under the name of *M. loennbergi*.

In an article, illustrated by one coloured and four black-and-white plates, in the February number of the *Entomologist's Monthly Magazine*, Dr. T. A. Chapman describes the larva of the butterfly *Everes argiades*, with figures, not only of the entire caterpillar, but also magnified representations of the shed skins at various stages of development. In the same issue Dr. D. Sharp continues his account of the beetles of the group Holophorini, dealing in this instance with the structure in the genital tube known as the ædeagus, which, as exemplified in *Meghelophorus aquaticus*, is described in great detail.

Aberrant modes of reproduction in certain well-known insects, such as the blue oil-beetle, the parasitic genus Stylops, and the vine-phylloxera, form the subject of an illustrated article by Mr. W. M. Scheyen in the January number of *Naturen*. A continuation is promised.

Writing in the January number of the *Zoologist* of non-sexual reproduction in sea-anemones, as observed at the Millport Marine Biological Station, Mr. R. Elmhirst remarks that although division is usually completed in a few days or weeks, especially among the members of the genus Anthea, yet that he has seen instances in which "double" individuals of Actinoloba showed no change during a period of several months. He also records a case in which an Actinia with two complete discs, mouths, and rings of tentacles retained the same form for close on four years in an aquarium. Possibly, of course, the somewhat unnatural conditions in such an environment may be a factor in these cases.

In *Spolia Zeylanica*, vol. x., part 36, Mr. A. Rutherford mentions that the females of a "glow-worm" (*Dioptoma adamsi*), in addition to the usual terminal light, have a number of other luminous points, apparently arranged in ten transverse rows. Somewhat similarly situated points of light also occur in the smaller males.

In the February number of the *Irish Naturalist* Mr. A. W. Stelfox gives a list of land and fresh-water molluscs from the Dingle Promontory, Kerry. Seventy-four indigenous species are recognised.

R. L.

## MINERAL STATISTICS.[1]

PROBABLY the first point that will strike the student of mineral statistics when he sees the report now before us is the extreme dilatoriness of our Home Office. This report, which covers the mineral statistics of the world up to the end of 1912, was not published until the end of 1914; the Chief Inspector endeavours to excuse this delay by a reference to the lateness of the publication of official foreign statistics, but it is a significant fact that a private firm in the United States of America issued a large volume covering the world's mineral statistics for 1913 in July last, so that our own official production is no fewer than eighteen months behindhand. Statistics of mineral production are practically valueless unless they are published promptly, and all the

[1] "Mines and Quarries. General Report with Statistics for 1912." By the Chief Inspector of Mines. Part iv., Colonial and Foreign Statistics.

information under this head afforded by the present publication has been common knowledge amongst all those interested for so long that it no longer presents any features capable of attracting attention.

The most interesting portion of the present report is accordingly that portion that deals with the labour employed in the world's mineral industry. It is shown that the number of persons engaged in this industry exceeded 6½ millions, more than one-third of whom were employed in the British Empire. It is interesting to note that more than one-half of this number was employed in coal mining, and as coal mining in different countries is more readily comparable than any other class of mining, because the conditions under which it is carried on present closer points of agreement, it may be profitable to compare briefly the labour statistics. Out of a total production of 1,250,000,000 metric tons of coal in the whole world, Great Britain alone produces 264,600,000 tons and the whole British Empire 314,500,000 tons, or about a quarter of the whole output. The other large producers are the United States with 484,900,000 metric tons; the German Empire, 255,800,000; Austria-Hungary, 51,700,000; France, 41,100,000; Russia, 31,300,000; Belgium, 23,000,000; and Japan, 19,700,000. It is curious to note that, with the exception of the United States, this list includes all the important nations engaged in the present war. The producing capacity of the miners engaged in this industry in metric tons per worker per annum is shown in the following table:—

| | | | |
|---|---|---|---|
| Great Britain ... | 230 | United States ... | 671 |
| Australia ... ... | 535 | German Empire... | 272 |
| Canada ... ... | 486 | Austria ... ... | 307 |
| India ... ... | 129 | France ... ... | 307 |
| New Zealand ... | 511 | Russia ... ... | 142 |
| South Africa ... | 347 | Belgium ... ... | 157 |
| | | Japan ... ... | 129 |

It will be seen that with the exception of India, where the labour is almost exclusively native, no part of the British Empire can show so low an output per head as does Great Britain itself, whilst of foreign countries it is only the smaller producers that rank worse than ourselves. In part, this small production is no doubt due to the fact that so many of our thicker and more easily wrought seams are to a large extent worked out, and that we are therefore compelled to work the thinner seams, from which a smaller output per man is necessarily produced. This drawback should, however, have been largely offset by the use of mechanical means for cutting and transporting coal, and it is difficult to avoid the conclusion that the low output is due to the restrictive policy covertly, if not overtly, encouraged by the Trades Unions.

It is some satisfaction to find that British coal mining is conducted with a great regard for the safety of the men engaged in this occupation. The death-rate per thousand workers employed is given as follows:—

| | | | |
|---|---|---|---|
| Great Britain ... | 1·17 | France ... ... | 1·49 |
| British Empire ... | 1·24 | Russia ... ... | 4·27 |
| United States ... | 3·26 | Belgium ... ... | 1·00 |
| German Empire... | 2·44 | Japan ... ... | 5·64 |
| Austria ... ... | 1·48 | | |

If the death-rate be compared, not per worker but per million tons of output, Great Britain will not appear in quite so highly favourable a light as compared with the United States, for example, that of the former being 4·66 deaths per million metric tons, and of the latter 5·44. Nevertheless, from every point of view our standard of safety may be looked upon as high.

It ought to be added that the above statements are calculated from the data tabulated in the report in question, which gives the figures for the various countries as though they were obtained in the same way, and therefore strictly comparable, which is far from actually being the case. Different countries use different methods of determining their mineral production, the number of men engaged in the industry and the number of deaths due to it, and the figures given are not therefore strictly comparable, though they may be expected to give a rough standard of comparison. One of the objects aimed at for many years by statisticians interested in mineral production was to get an international understanding as to the basis on which all these figures were to be determined, but now that Germany has in a few months destroyed the work of many years of European civilisation, and by her own relapse into barbarism has dragged all other nations down with her, any prospect of agreement on such minor international questions appears to be quite hopeless. H. L.

## *REPRODUCTION AND HEREDITY.*

PROF. J. A. DETLEFSEN (University of Illinois) has made an important contribution to our knowledge of "Mendelian" inheritance by his "Genetic Studies on a Cavy Species Cross" (Carnegie Institution, Publication No. 205, 1914). The research—begun by Prof. W. E. Castle—is of interest as affording information from the crossing of two distinct species, for the wild Brazilian cavy (*Cavia rufescens*) is apparently sharply distinct from the common domestic guinea-pig (*C. porcellus*). The sterility of hybrid animals is known to be a rule admitting of many exceptions. In the experiments with cavies here described, crosses between *C. rufescens* males and *C. porcellus* females gave completely sterile male and fertile female hybrids. By mating the female hybrids with *porcellus* males, quarter-wild hybrids were obtained, again sterile males and fertile females; but by repeated back-crosses of female hybrids to *porcellus* males, individuals with increasing fertility were obtained. "Fertility seemed to act like a very complex recessive character; for the results obtained were what one would expect if a number of dominant factors for sterility were involved, the elimination of which would give a recessive fertile type." The paper is noteworthy because skeletal characters of the parents and hybrids are figured and compared, in addition to the usual external features, such as coat-colour.

A case of sex-limited inheritance in plants is discussed by Mr. G. H. Shull, who has made crosses between the typical *Lychnis dioica* and its variety *angustifolia* (*Zeitschr f. indukt. Abstammungs u. Vererbungslehre*, xii., 5, 1914). The narrow-leafed form is a recessive which reappears in half the males of the $F_2$ generation. All the $F_2$ broad-leafed males are heterozygous for the broad-leaf factor, while of the females half are heterozygous, half homozygous for this factor. As regards sex, the female Lychnis is a homozygote and the male a heterozygote.

Dr. Raymond Pearl continues his observations on the reproductive organs of domestic fowls. In a paper on the effects of "Ligation, Section, or Removal of the Oviduct" (*Journ. Exper. Zoo.*, xvii., 3, 1914), he states that these operations have no injurious effect on the growth of the ovary, and that after removal or closing of the oviducal funnel, eggs are passed into the body-cavity, where, if not absorbed at the peritoneal surface, they may cause "serious metabolic disturbances." In the *Journ. Biol. Chemistry* (xix., 2, 1914) Dr. Pearl informs us that injection of the