

taken seriously ill and removed. The captain took his wife and grandson on board and proceeded, but all three were taken ill. Bamfield died on November 6 and his grandson on the previous day. The cause of death was certified under that convenient term "ptomaine poisoning," but was afterwards proved to be due to fumes from the ferro-silicon of 50 per cent. grade (actual analysis, 53.9 per cent. silicon).

It required, however, yet another tragedy, with the added scare of cholera, to compel investigation, and this was provided by the case of the *S.S. Ashton* in December, 1908, on which, after a voyage of twenty-four hours only, from Antwerp to Grimsby, all the occupants of the emigrant quarters, fortunately only five in number, died between 6 p.m. on December 12 and 12.30 p.m. on the following day. This time cholera was feared, but examination by the Government bacteriologist at once negated this view. Mrs. Bamfield wrote on December 17, 1908:—"It has occurred to me since reading the account of this poisoning that there may be some of this (scrap) in the *S.S. Ashton*." Immediately these deaths were reported in the newspapers, Mr. Hodgson, Mrs. Bamfield's son-in-law, wrote to Dr. Simpson, medical officer of health for Grimsby, making a similar suggestion, and that this was the cause of the deaths (p. 20):—"It was apparently in consequence of this letter that attention came to be directed to the possibility of the deaths on the *S.S. Ashton* having been due to the presence of the ferro-silicon on board, suspicion having arisen, in the first instance, that the fatal illness of the passengers was due to cholera." This was abundantly proved, and resulted in the elaborate investigations of which this report is the record.

The report is a valuable one, showing that the authors have recognised the difficulties and grappled with them. The original should be in the hands of all interested in ferro-silicon from a medical, a shipping, or a metallurgical aspect. As the authors themselves state, further investigation is yet required, although rules that will almost ensure safety have been found.

Ferro-silicons of low grade, containing not more than 15 per cent. silicon and made in the blast-furnace, are beyond suspicion, and as safe to handle and to store as ordinary pig iron. The high-grades, 25 to 95 per cent. silicon, made in the electric furnace, and imported to the extent of about 4000 tons per annum, mostly from France, but to a less extent from Austria, Scandinavia, &c., include the dangerous varieties. The bulk has been made to 50 per cent. grade for little apparent reason other than ease in calculation of mixtures, a matter that may excite surprise until it is remembered that a manager, with his hundred worries per day, tries to avoid the hundred-and-first, in case it might prove "the last straw." The gases given off may at first have included acetylene, owing to the ferro-silicon being made in calcium carbide furnaces, but as that is never done now the poisonous gases given off are phosphoretted hydrogen and arseniuretted hydrogen, roughly 90 to 95 per cent. of the former to 10 to 5 per cent. of the latter. All are agreed that until more is known of the fundamental causes, those varieties around 50 per cent. silicon are most dangerous, and should neither be made nor bought. La Chambre Syndicate des Forces hydrauliques states that 30 to 40 per cent. and 47 to 65 per cent. grades should be avoided, but the remarkable omission of 40 to 47 per cent. grades is not supported by any experimental proof. The authors recommend the manufacture or use of only those varieties below 30 per cent. or above 70 per cent. silicon content for the present.

The section on the functions of ferro-silicon in steel manufacture hardly gets to the root of the real idea sometimes, but is near enough for general readers; and technical men are not likely to refer to this section of the report. It will be read for the results of the experiments and general investigations carried out and the opinions formed on the results, and these can be recommended. The report contains, besides matter already indicated, reports of conferences with Sheffield firms using ferro-silicon, investigations at places of manufacture, a description of the manufacture of ferro-silicon, conclusions and recommendations, Dr. W. Hake's chemical investigations, and Mr. Bennett's report on the composition and structure of ferro-silicon.

As the  $PH_3$  is only formed in contact with moisture, the

material used to be packed in sealed drums, and sometimes was coated with paraffin wax; but this does not deal with the gas present in the cavities, and only transfers the danger, for drums exploded on opening and men removing the paraffin were made ill, so that these methods should be abandoned.

The report recognises an important point that is still obscure (p. 109):—"Dr. Heroult expressed himself as decidedly of opinion that the specially undesirable qualities exhibited by this particular grade (50 per cent.)—tendency to spontaneous disintegration and evolution of poisonous gases—were related to the amount of aluminium present in the alloy. He was unable . . . to advance any definite reasons for the opinion he had formed." Mr. Bennett later expressed the same opinion, and suggested that, as the heat of formation of  $Al_2O_3$  is very great, the presence of a large percentage of aluminium is indicative of very high temperature reactions in the furnace, and that these reactions are favourable to the formation of compounds which readily break up into poisonous and explosive gases."

This can hardly be so, for Prof. Arnold, who, it is understood, will present a report later, has had one lot of ferro-silicon divided into two portions and melted in two crucibles. When molten, to one only was added 3 per cent. aluminium, and the two portions were cast into separate ingots. The present writer, being interested in the experiment, broke a piece off each ingot, and, dipping them in water, noticed that one had no particular odour, but the other smelt very strongly, the latter proving to be that to which aluminium had been added. A too enthusiastic repetition of the experiment as a test produced just a feeling of discomfort which the fresh air soon dispelled, this last being a point of much importance, as where lives were saved it was practically the governing remedy. "Two of the passengers also left their cabins and, although very weak, succeeded in getting on deck. These two survived" (p. 15). No. 5 of suggested regulations may be quoted:—"Storage places at docks or at works where ferro-silicon is used should have provision for free access of air, and should be situated at a distance from work-rooms, mess-rooms, offices, &c." (p. 115).

The main conclusions of the report have been mentioned, but all interested in the subject should obtain a copy, as the details of the investigations are well worthy of study.

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### THE POSITION OF THE NEGRO AND PYGMY AMONGST HUMAN RACES.<sup>1</sup>

A FULL analysis of the structural features of the negro shows that in many points he is more highly specialised than the less pigmented races of mankind, while in other characters he has remained more primitive. Although on the Continent there is a decided tendency amongst anthropologists to trace the descent of the human race through a non-anthropoid stock, yet those most familiar with the anatomy of the Primates still agree with Huxley's doctrine that the community of structure shared by man and anthropoids pointed to a direct community of origin. The deeply pigmented skin was a primitive feature; the gorilla was the negro amongst anthropoids; the three species of chimpanzee varied as the period of life at which pigmentation appeared. All available evidence points to a pigmentation of the early human stock, but speculations are handicapped by an ignorance of the functional value of pigment. It appears to protect the deeper tissues from certain injurious rays which are intermediate to heat and light. The skulls of Palæolithic Europeans show so many resemblances to those of Australian aborigines that a legitimate suspicion may be raised as to whether or not they did not also share some degree of the aboriginal pigmentation. The Palæolithic Gibraltar woman, whose skull is preserved in the Museum of the College of Surgeons, shows no community with the negro in the characters of her nose. The nose of that skull is altogether unlike that of any human race now known; it shares some features with the gorilla, while

<sup>1</sup> Abstracts of four Hunterian Lectures on "The Anatomy and Relationships of the Negro and Negroid Races," given at the Royal College of Surgeons, England, by Prof. Arthur Keith.

in others it appears to foreshadow the prominent nose of the modern European.

The evidence of the nose of Palæolithic man leaves the question of pigmentation of the early European open. The distribution of pigmentation among modern races could be explained best by supposing that the appearance of the fairer races—the Caucasian and Mongolian—was one of the more recent events of human evolution, and that the site of their evolution was in the central populations of the more northern parts of the Old World. The frizzled hair of the negro was a highly specialised feature. Their thick everted lips, unlike the thin anthropoid lips, at first sight seem also to be so, but when the arrangement of the labial musculature is examined, it is seen that the negro's lips are more anthropoid than the European's; but the European form, notwithstanding their apparent thinness, appears to be a modification of the negro form. The high and prominent cheek-bones of the negro are due, not to an absolute greater breadth of the face, but to the fact that the muscles of mastication have become specialised in different directions in the negro and European; in the negro the masseter muscle, which arises from the cheek-bone, is particularly large, whereas in the European it is the temporal muscle, which has its fixed basis on the side of the skull, that retains the greatest relative development.

The apparent breadth of the negro's face is largely owing to the fact that the basal part of the skull, to which the neck muscles are attached, is small. The small attachment of neck is a feature of the young of all Primates, and also one in which the negro has assumed a less anthropoid form than the European. The prognathism of the negro is due to several factors; it is chiefly due, not so much to a larger, but to a healthier dental development, which ensures a due forward revolution of the jaws during the eruption of the permanent teeth, thus providing an ample air-way in the pharynx. In Europeans the revolution forwards of the jaws showed a distinct tendency to become arrested prematurely, thus contracting the pharynx. The negro condition was the more Simian, but it is also one which modern Europeans would willingly share with him, because of its functional merits. Sir William Flower's method of estimating prognathism gave misleading results. The most accurate method of stating the development of the jaws was to give the area of the palate and the total size of the teeth.

Some of the most characteristic features of the negro race were to be seen in their foreheads. While Palæolithic Europeans showed the Simian beetling brows and receding forehead, features still shown in some degree by modern white races, the great majority of African negroes were characterised by prominent foreheads and a complete absence of that condition which might be described as supra-orbitalism. It is true that some tribes on the west coast, the oceanic negroes, and the Tasmanians still retain this primitive character. Indeed, the outstanding feature of the negro's skull is a tendency to retain characters of the immature skull of other races. Those who know the psychology of the negro best ascribe to his brain the boyish nature here ascribed to his skull.

The pygmies, usually described as Negritos, are true negroes in which the tendency to assume immature characters has become hereditary to an extreme degree. They are widely distributed. Sir Harry H. Johnston has shown how they are scattered amongst the forest tribes from the west coast almost to the east coast of Equatorial Africa; they stretch southwards almost to the Cape, and isolated communities are found as far eastwards as the Philippines and New Guinea. Two explanations may be offered for their distribution:—(1) they are remnants of a race that was spread formerly throughout the southern half of the Old World; (2) they are modifications produced locally from the larger negro. The second explanation is apparently the correct one, for the Congo pygmies share all the physical features of the Bantu except size; the Bushman has the characters of the Hottentot, while the pygmies of the far east find their nearest representatives in the negroes of the Oceania. Recent advances in our knowledge of human pathology make this supposition of the origin of pygmies more probable. Disturbances in the

secretion of certain glands, such as the pituitary and thyroid, lead to the production of the characters of Palæolithic features in some individuals and true dwarfism in others. In the Miocene period the large-bodied Primates had already appeared; primitive men were certainly not pygmies in size.

An analysis of the cranial features of the aborigines of Tasmania and of Australia shows that we have in these two races an early stage in the differentiation of the negro and negroid races of mankind. The Tasmanian is the most primitive type of negro yet discovered; the Australian, on the other hand, although deeply pigmented and less Simian in some features than the Palæolithic European, is the most primitive representative of the negroid race. Negroid as he is, the native Australian represents a stage in the evolution of the dominant non-negroids of the northern hemisphere. It is a remarkable fact that the negro and negroid races occur side by side, not only in Austral-Asia, but in Asia proper and in Africa. The negro Semangs of the Malay Peninsula live with the negroid Sakai as neighbours; the Vedda's of Ceylon are not far from the negro of the Andamans; even in Quaternary Europe the negro race discovered by Dr. Verneau in the caves of Grimaldi were early successors, if not contemporaries, of Palæolithic man. The Grimaldi negroes find their nearest modern representatives in the Oceanic, not the African, negro; equatorial Africa and northern Europe were the probable centre in which the black and white races had reached their present degree of structural evolution. The two centres were linked together, and always had been linked, by racial zones which showed intermediate characters. Modern anthropologists are inclined to ascribe the characters of intermediate races to intermarriage. Interbreeding had certainly played a part, but probably a small one. The truer explanation seems rather to lie in regarding intermediate races as representing intermediate stages of physical and mental evolution.

#### TREES AND FORESTS.

THE botanical gardens at Peradeniya, Ceylon, are celebrated for their vegetation splendour, so that a list of beautiful flowering trees recommended by the curator, Mr. H. F. Macmillan, will appeal to many outside the range of those for whom the Circular (vol. iv., No. 20) of the gardens is immediately intended. In the author's opinion, the leguminous tree *Amherstia nobilis* is not to be excelled, although *Lagerstroemia flos-reginae* passes under the name of "pride of India," and *Poinciana regia* is the famous "flame-tree." The *Amherstia* was introduced to Ceylon from Burma, and it is remarkable how many of the plants mentioned have been imported from the tropics of the New and Old World. *Gliricidia maculata* is a recent introduction from the West Indies; *Solanum macranthum*, the "potato-tree" from Brazil, is noteworthy as the only species of the order that grows to the size of a tree.

A description of the indigenous trees of southern Rhodesia, together with their vernacular names and products, is provided by Mr. C. F. H. Monro in the Proceedings of the Rhodesia Scientific Association (vol. viii., part ii.). An important matter is the production of timber suitable for mining, construction, and agricultural purposes. The most useful timbers are yielded by *Copaifera mopani*, *Pterocarpus angolensis*, *Phoinia mahobohobo*, and *Parinarium mobola*. *Baikiaea plurijuga* is known as Rhodesian teak; *Azelia cuanensis* supplies the local mahogany, while a somewhat similar, handsome wood is furnished by *Faurea saligna*, a species of Proteaceæ. The woods of some of these, as also of *Callitris Whytei* and *Terminalia sericea*, are said to be ant- and borer-proof.

Two forest pamphlets (Nos. 12 and 14) recently issued by the Government of India relate to *Berrya Ammonilla*, a tree, belonging to the family Tiliaceæ, that is found principally in Burma, and *Pterocarpus macrocarpus*, a leguminous tree yielding Burma padauk timber. Regarding the former, logs up to 20 feet in length, and measuring  $4\frac{1}{2}$  feet in girth, can ordinarily be obtained. The timber is tough, elastic, and straight-grained; it