REPORTS

ACTIVITIES OF THE ENGINEERING FOUNDATION

THE scientific laboratories of fourteen universities are cooperating with the Engineering Foundation in an effort to solve technological and human problems in the fields of mechanical, electrical, mining and metallurgical and civil engineering, according to a report by the foundation.

Two government bureaus are aiding in special investigations. Working with other groups, the four founder societies, of which the foundation is a research agency, are advancing engineering education and professional development as well as personnel research.

Long-term projects sponsored by the foundation include alloys of iron research, comprising a review of world information on alloy steels and alloy cast irons; and welding research, embracing more than sixty fundamental studies in college and industrial laboratories and a compilation of welding literature.

Cottonseed processing research is being carried on in laboratory and field by a committee of the American Society of Mechanical Engineers with headquarters at the University of Tennessee.

World interest in earths and foundations has been aroused by a committee of the American Society of Civil Engineers, which has directed research in this sphere since 1929. A soil mechanics laboratory has been established at Harvard University. The lateral supporting power of soils to individual piles, anchors and bulkheads is being studied at Yale University. Models of earth dams and coffer-dams are furthering extensive investigations at the University of Minnesota.

Barodynamic research, the study of weighty masses by means of special centrifuges, is going forward at the School of Mines of Columbia University. Confirmation of laboratory results has been obtained from surface and underground observations of mining problems in Europe and Africa. A device for determining side pressures of loose materials and a new type of artificial support in mines have been developed. Stress distribution in mine pillars and roofs and the time effect in rock structures strained beyond elastic limits have been determined.

Designs for a new type of critical pressure steam boiler may grow out of a basic investigation at Purdue University by the Society of Mechanical Engineers. Determinations of viscosity of water and steam and reactions between steam metal at elevated temperatures have been studied particularly. At the University of Michigan, a boiler feed water research project is concerned with methods of determining oxygen in the waters.

The Non-Metallic Minerals Experiment Station of the U. S. Bureau of Mines in New Brunswick, N. J., is attacking the problem of embrittlement in boiler steel and expects to learn its cause and means of prevention.

A specially built machine at the Massachusetts Institute of Technology is testing the strength of gear teeth. Recent operations have been devoted to experiments with surface fatigue of cast iron.

A large piece of steel known as a "test log" is being cut at the University of Michigan in the course of an investigation of the efficiency of cutting fluids, that is, the fluids used for lubricating and cooling metal-cutting tools. A handbook on "Cutting of Metals" has recently been completed under direction of the American Society of Mechanical Engineers.

The National Bureau of Standards, Massachusetts Institute of Technology, Cornell University, the Universities of California, Ohio, Oklahoma and several industries are conducting experiments with long-radius flow nozzles, used in fluid meters, in order to provide more economical and convenient means for precise measurements of large quantities of liquids or gases, as in efficiency tests of steam and hydraulic power installations. In some instances steam is used, in others, water, through nozzles ranging from three inches to sixteen inches in diameter and also through two-inch pipe orifices.

Ten years of research on pure iron electrodes, sponsored by the American Institute of Electrical Engineers at Lehigh University, was recently completed. This phase of welding research will be merged in the comprehensive program of the foundation's welding research committee.

Information on the creep and relaxation of metals was gathered last year as part of a study of metal plasticity carried on at the University of Pittsburgh, with research facilities provided by the Westinghouse Research Laboratories. Special apparatuses were designed and constructed for the work, the results of which are proving of practical value.

Nearly 500 specimens of concrete are under observation in long-time tests at the University of California to determine the various factors in the plastic behavior of concrete. Three new series of investigations have been started, comprising studies of the moisture loss accompanying plastic flow under sustained load, of the validity of the assumption of plane bending in beams under sustained load, and of the effect of compound composition and fineness of cement upon plastic flow. Thermal stress studies have already been completed.

Through the Personnel Research Foundation, the Engineering Foundation is encouraging forms of em-

ployer-employe cooperation by visits to industrial plants, correspondence with governmental departments and labor organizations and by conferences.

Six thousand copies of "Self-Appraisal for Junior Engineers" were placed in the hands of engineering students last year by the Engineers' Council for Professional Development, composed of representatives of the national engineering societies and professional organizations. Nearly 5,000 copies of a booklet on "Engineering—A Career—A Culture" were distributed during the year.

The council, conducting an investigation on the accrediting of schools, sponsored visits to schools in New England and the Middle Atlantic States. The work is now being initiated in other states. The council is also directing studies on the evaluation of professional qualifications, guidance literature and aptitude tests. A selected reading list of books on general fields of knowledge for young engineers and a bibliography of technical literature have been prepared.

The council seeks uniformity in engineering degrees. Conferences are being arranged for boys interested in engineering, their parents and local engineering groups. A survey has been made of university extension facilities, and a manual on guidance for local sections of the national engineering societies is available.

SPECIAL ARTICLES

THE NEW DISCOVERY OF THREE SKULLS OF SINANTHROPUS PEKINENSIS

FOLLOWING the recovery of several fragments of a very small adult of *Sinanthropus* from Locus I (Locality 1) in the latter part of our spring field season at Choukoutien, we had the good fortune during the fall season of this year to unearth three additional more or less well-preserved skulls, two of which were recovered in one day. All three skulls belong to adult individuals. The skull recovered first, and designated as Skull I of Locus L, is the largest with a cranial capacity of approximately 1,200 cc and with its coronal and sagittal sutures partly fused. The second skull (Skull II of Locus L) is the smallest of the group, with a cranial capacity not higher than 1,050 cc and its coronal, sagittal and lambdoid sutures fused. This skull shows a clear indication of the persistence of a metopic suture. The third skull (Skull III of Locus L) is smaller than Skull I but larger than Skull II. The cranial capacity of Skull III is approximately 1,100 cc. Although all the sutures of this skull are still patent, yet other characteristic features make it evident that we are dealing with a young adult individual. Parts of the face are preserved in all three skulls, thus, in Skull III both nasal bones and the entire lateral border of the orbit in complete connection with the brain case; in Skull II the frontal process of the maxilla, the lower border of the orbit, the cheek-bone and fragments of the alveolar process of the upper jaw with palate and ten teeth *in situ* (premolars and molars) which, however, are not connected with the skull. Belonging to Skull I are several teeth only.

I had previously arrived at the conclusion that the large teeth may belong to male individuals and the small to female individuals. This assumption has been confirmed by the fact that the large type of teeth was found to pertain to the bigger skull (Skull I) and the small type of teeth to the small skull (Skull II). Thus it seems quite certain that the latter represents the skull of a female individual and the former that of a male individual.

All three skulls have the same appearance as Skull I of Locus E described by Davidson Black.[1] However, since this skull belongs to a child of about 8 to 9 years (*cf.* Weidenreich, 1935)[2] the characteristics of the *Sinanthropus* type are much more pronounced in the recently recovered skulls. Measurements reveal that *Sinanthropus* as a whole occupies the lowest place in the order of all hominids, including *Pithecanthropus,* in regard to those peculiarities which determine its position in the line of evolution. This is particularly true for Skull II of Locus L, while Skull I of Locus L in part falls within the lower limits of the range of variations of the Neanderthal group. However, Skull II apparently is even lower than *Pithecanthropus,* the difference being that the *Sinanthropus* skull shows a more pronounced frontal tuber than *Pithecanthropus,* the entire forehead of which is flattened. The smallness and lowness of *Sinanthropus* Skull II is all the more remarkable since the skull fragments recovered last summer and considered to pertain to an adult individual are still smaller in dimensions than the respective parts of Skull II of Locus L and *Pithecanthropus* (*cf.* Weidenreich, 1937).[3]

As to the face, the parts preserved in Skulls II and III yield a rather good idea of the general structure, at least as far as the upper parts are concerned. The nasal bridge is broad and flat. There is no groove between the root of the nose and the forehead. The orbit is very low; the lateral border recedes backwards below the frontal zygomatic suture. The lacrimal fossa is missing in all skulls. The orbit is deep and the superior orbital fissure very small. The cheek bone is remarkably high, as high as that of the Rhodesia Skull. A canine fossa does not exist and the anterior surface of the frontal process of the maxilla

[1] Davidson Black, *Palaeontologia Sinica,* Ser. D, 7: 2, 1931.

[2] Franz Weidenreich, *Bull. Geol. Soc. China,* 14: 427–468, 1935.

[3] *Idem., Bull. Geol. Soc. China,* Ting Memorial Volume (in press).