a very physical nature, as, for example, a special method of measuring the abnormal viscosity which certain liquids have in layers immediately adjacent to a solid boundary: this method consists in blowing off the liquid with a controlled current of air and measuring the dimensions of the resulting wedge-shaped film by interference methods.

Academician Sergei Vavilov, director of the Lebedev Physics Institute, who is in charge of research at the Optical Institute, is keenly interested in the history of physics: he published a *Life of Newton* in 1943, in connexion with the tercentenary celebrations of Newton's birth, and edited a collection of papers on various aspects of Newton's work, to which he contributed a chapter on aspects of Newton's optical work. He also contributed a study of Galileo's work on optics to a recently published Russian work on Galileo. He tells me that he is now engaged on a complete Russian translation of Newton's "*Lectioes Opticae*": the English translation which appeared in 1728 is of the first part only.

Reference must be made to the work of Rehinder on the effect of surface-active substances for facilitating the working of metals, and particularly to some very interesting recent work on the effect of surface-active films in decreasing the resistance to mechanical flow of single crystals of metals. These films send up the electrical resistance appreciably, indicating that they penetrate deep into interstices in the metal.

If it does nothing else, this brief account may give some idea of the variety of the work in pure and applied physics that is proceeding with vigour in the U.S.S.R. It cannot, however, convey the spirit of cordiality and co-operation in which we were everywhere received, which has left a deep and abiding impression in our minds.

ARCHAEOLOGY AND ANTHROPOLOGY

By PROF. V. GORDON CHILDE

University of Edinburgh

ARCHAEOLOGY and anthropology are classed as sciences in the U.S.S.R. and with other social sciences stand under the aegis of *Akademiya Nauk* as much as the natural sciences. Hence during the War, archaeologists and anthropologists have been 'reserved' like geologists or physicists. However, several very promising men of the younger generation, notably E. Krichevskiy, perished during the siege of Leningrad, and the gaps left by such casualties will take time to fill. At the same time, archaeological research naturally suffered worse dislocation since 1941 than that in sciences more directly related to the war effort.

Museum collections had inevitably to be packed up. But in Moscow the State Historical Museum is already re-installed fully and open to the public; in the University of Moscow, despite considerable damage sustained by the building, the collections of the Anthropological Institute are actively in course of reinstatement, and I was able to handle the skull of the Neanderthal boy from Teshik Tash in Uzbekistan. In Leningrad the treasures of the Hermitage were not due to come back from hiding places in the Urals until August; in the Ethnographic Museum of the Academy an impressive exhibition illustrated by choice specimens, hastily unpacked and specially arranged by the staff, anthropometric, archaeological

and ethnographic work of the last ten years. Terrible damage, on the other hand, has been done to the famous collections in Kiev and in many local museums in the Ukraine and the Caucasus, where much unpublished material has been destroyed or dispersed by the invaders. A fine Hellenistic sarcophagus from the Taman Peninsula, abandoned by the Nazis, has just been restored in Moscow from the fragments to which the enemy had deliberately reduced it.

Field-work and the study of the collected material were never entirely suspended during the War. The exhibition in Leningrad and a special session of the Institute for the History of Material Culture (IIMK) held in Moscow introduced the Academy's guests to the results of operations so recent that no published accounts have reached western Europe. In Transcaucasia, Zamiatnin's surveys of Abkhazia, initiated in 1934, have brought to light the first undoubted Acheulean hand-axes from the territories of the Union as well as flake industries of Clactonian and Mousterian types, all illustrated at Leningrad. Tolstov described before the Institute the main results of the expedition under his direction in the ancient Khorasmia (the lower Oxus valley). The earliest settlements discovered belong to hunter-fishers whose ceramic remains show analogies with the chalcolithic cultures of western Siberia and the Russian steppes. To the later Bronze Age belong some very schematic rock-engravings, while during the first millennium B.C. an advanced urban civilization, based on irrigation, developed. From the fourth century A.D. cities began to give place to isolated castles and fortified manors. At the same session Passek described her first explorations at Vladimirovka in the Bug basin, a large village of the 'Painted Pottery Culture' often called Tripolyan—excavations abruptly terminated by the Nazi invasion in 1941. Her survey has revealed there the existence of half-subterranean dwellings (*zemlianki*) as well as no less than five rings of *ploshchadki*. The 'areas' of burnt clay designated by the latter term turn out to be the floors of rectangular houses, which have been baked by fires specially kindled upon them and on which are found clay ovens, ritual pedestals, querns and groups of vases. These observations confirm and supplement the conclusions drawn from the excavations at Kolomishchina on the middle Dnieper, published with full documentation (in Ukrainian with French and Russian summaries) in *Tripil's'ka Kul'tura* (Kiev, 1941).

In physical anthropology the outstanding exhibits in Leningrad were the reconstructions from the skeletal material of faces and busts ranging from the Neanderthaler of Teshik-Tash to historical personages like Timur and Yaroslav Mudryy, executed by the sculptor anthropologist, Gerasimov, and exhibited with a convincing explanation of his methods. At the same time an anthropometric study is in progress on the abundant skeletal remains from the Fatyanovo cemetery of Balonovo near Kazan, while Debetz is in eastern Siberia continuing his anthropometric survey. Similarly Okladnikov, being again in Yakutia, could give no account of his interesting archaeological and ethnographic discoveries along the Lena. For the same reason, we must await publication to hear of Grakova's latest finds in Fatyanovo cemeteries and her geographical and chronological classification of Fatyanovo relics, which is already prepared for publication.

Publication of archaeological and anthropological periodicals in Moscow and Leningrad has been sus-

pended during the War, but not in the Transcaucasian republics—the Georgian branch of the Academy, for example, published Kuftin's "Earliest Roots of Georgian Culture in the Caucasus in the Light of Archaeology" (using also philological evidence and that from early MSS. miniatures) in 1944. Moreover, the complete editions of two numbers of *Materialy i Issledovaniya* were annihilated by enemy action in Leningrad. Now No. 12 of *Kratkie Soobshchennia* has already been issued and new volumes of *Sovetskaya Arkheologiya* and similar publications are going to press. At the same time, even during war years, excellent works of popularization were published by the Academy, such as histories of the ancient world and of the Middle Ages, edited respectively by Struve and Kosminsky and both designed for middle schools. An exhibition of all its publications in the domain of social sciences was organized in the Academy's library and profoundly impressed Western visitors.

VERTEBRATE PALÆONTOLOGY

By PROF. D. M. S. WATSON, F.R.S.

University College, London

THE study of fossil vertebrates in the U.S.S.R. is concentrated in the Institute of Palæontology of the Academy of Sciences in Moscow, but two men who hold posts in Leningrad are doing important work in association with the Institute.

Fossil fish of many ages are found in the Union, often most beautifully preserved and of great interest. Asiatic Russia has produced a Lower Old Red Sandstone fauna, the Leningrad district a series of faunas from the top of the Middle Devonian upward, which are generally represented by perfectly preserved though fragmentary remains, and are of great interest because they are comparable with those of the Upper Old Red Sandstone of Scotland, the Rhineland, North America, and the Arctic regions. Carboniferous, Permian and Jurassic fish are known from Asia in perfect preservation; there are even late embryonic Palæoniscids!

The early Tetrapod faunas are represented by two horizons, known nowhere else in the world, which are more recent than the Artinskian Clear Fork of Texas, and older than the Tapinocephalus zone of South Africa. These faunas include Labyrinthodonts of structure intermediate between those of the Lower and Upper Permian, which are of much importance for our understanding of the evolution of the group, and they have yielded an extraordinary, extremely flattened animal which seems to be a Seymouriamorph. There are new Cotylosaurs of great interest, but the most striking specimens are those of mammal-like reptiles, belonging to the Deinocephalia, which bridge the structural gap between the Pelycosaurs, and specifically the Sphenacodontia, of Texas, and the South African Titanosuchids and Tapinocephaloids. These animals are perfectly preserved; indeed, the bones from one locality, where they occur in essentially quite unconsolidated sand, appear like fresh bones, the skulls being completely free of matrix inside and out, and complete skeletons are known. With them is found *Venjukovia*, a forerunner of the Dicynodonts, perhaps an actual ancestor of *Endothiodon*, itself derived from a primitive Tapinocephaloid.

On the River Mesen there occurs a "M." Permian fauna of small animals which includes two Cotylosaurs essentially ancestral to *Procolophon*, and a remarkable reptile, *Mesenosaurus*, the rather Pelycosaur-like skull of which is in some ways most reminiscent of *Youngina*, and which may perhaps prove to be the ancestor of the whole group of Diapsids. The later Permian and Triassic Tetrapods include a varied assemblage of Labyrinthodonts and Seymouriamorphs of great interest, many Pareiasaurs and Dicynodonts, Gorgonopsians, Therocephalia and a most primitive Cynodont, all comparable with African animals.

The Tertiary rocks of the Union in Europe and Asia have already yielded mammalian faunas of many horizons from the Oligocene to to-day, and are being actively explored. Indeed, the Museum of the Institute has already mounted a splendid skeleton of a Lower Miocene long-jawed Mastodon, perhaps the best in the world. They have half a dozen mounted skeletons of fossil rhinoceroses, including that of the giant *Indricotherium*, and much other material of equal quality.

It is evident that the collecting expeditions have been most ably carried out, the materials must have been properly bandaged, the preparation is perfect, and the Institute has an excellent artist and photographer.

Vertebrate palæontology, like palæontology in general, is essentially an international science; conclusions about phylogeny can only be drawn with any satisfaction after a study of the whole materials in the world—and the U.S.S.R. includes a very large part of the world. Lying as it does over a great continuous land mass between North America, India, Europe, and, though it does not directly meet that continent, also Africa, it may be expected to form the link between these regions of the earth and thus provide the solution of many problems of correlation of terrigenous deposits of all ages throughout the globe.

The palæontologists in the U.S.S.R. know more than a hundred entirely new localities which yield vertebrate fossils and are making arrangements for their exploration. There is, to my mind, no doubt that in the immediate future the U.S.S.R. will become the great centre of activity of vertebrate palæontology, giving us new facts in abundance and solving many outstanding problems of phylogeny and of migration.

It was therefore most pleasing to me to meet my colleagues in Moscow and Leningrad, to spend some happy days in discussion with them, and to establish a friendship which will, I hope, continue for many years. The group is composed of most active, enthusiastic and able men and women, in whose hands I feel that the future of vertebrate palæontology may safely rest.

But a real need is that of closer contact with workers in other countries, and especially of travel. It is essential that every palæontologist should be familiar with his materials, and they are preserved in museums all over the world. The Soviet workers should be able to visit the British Museum and those in America and Europe as easily as we can, and I, and my colleagues in England and America, should be able to visit the U.S.S.R. and give to the magnificent collections which are accumulating there the study which they deserve. It is on such free association of workers in all lands that satisfactory work on fossil vertebrates ultimately depends.