iron nails, Jerusalem will once again be restored to the Jews.

The Greeks and the Cretans would appear to have been the first European peoples to use iron. Homer, who lived about 880 B.C., was very familiar with the metal. The Homeric age, however, as depicted in the "Iliad" and "Odyssey," is several centuries earlier; the Phaeaceans referred to in the latter work are believed to have been the Minoans of Crete, famous for their sea power—the Britons of the Mediterranean. The Homeric period was transitional between the Bronze and the Iron Ages. Iron was listed amongst the treasures of the wealthy, but was in general use only in the peaceful pursuits of agriculture. Probably the metal lacked homogeneity and could not be relied upon in such thin strips as would be necessary for swords, owing to its tendency to bend or snap. The Vikings 2000 years later were familiar with this difficulty, as is evident from the Icelandic sagas. One frequently reads that the swords would not "bite," and occasionally we are told that the sword bent so seriously that the warrior often had to straighten it under his foot! This surely was giving his opponent too much of an advantage.

The Romans about 2000 years ago were skilled metallurgists. Virgil in his "Aeneid," written about 40 B.C., describes a smithy in full work, and refers to the steel hissing as it is quenched in water, showing that the art of tempering was practised. Pliny some years later showed a wide knowledge of the ores of iron and of the working of the metal. He appears also to record, in what is otherwise an obscure passage, the accidental production of cast iron. For this product, however, there was at the time no practical use, as the Roman furnaces were incapable of dealing with it. The tendency of iron to rust was regarded by Pliny as Nature's punishment on the metal which, owing to its use in warfare, "brings the greatest dangers upon perishable mortality." Occasionally, as now, the rusting of iron was turned to good account. A very clever metallurgical conception was attributed by Pliny to Aristonidas, who, wishing to express in a statue at Rhodes the "fury of Athamus subsiding into

repentance after he had thrown his son Learchus from the rock, blended copper and iron, in order that the blush of shame might be more exactly expressed by the rust of the iron making its appearance through the shining substance of the copper."

Iron was regarded as symbolical of Mars, the god of war, and the alchemists represented it by the symbol ♂ , which is usually supposed to be derived from the shield and spear of that god. The popular idea that iron is a useful remedy and invigorates the constitution owes its origin largely to this connexion with the virile god, who was supposed to transmit his strength to his dedicatee. Ancient legend has it that King Iphiclus of Phylacea about 1380 B.C. was very anxious to beget children, and was successfully treated by the shepherd Melampus, who dosed him with iron rust in wine—the earliest *vinum ferri* of the pharmacist on record!

Iron was known to the Britons long before the advent of Julius Caesar. The Romans greatly extended its use in Britain, and numerous objects of iron are continually being unearthed on the sites of various ancient Roman stations. One of the most interesting of these is an iron ring, probably the remains of a ferrule, found last year at Uriconium. It appears to have been made by bending a strip of iron into a circle and soldering the ends together with some copper alloy. This is the first recorded example of such work.

Cast iron was known in Sussex by 1350 A.D. and soon became quite a familiar commodity. It was at first used exclusively for casting purposes. In 1516 a cast-iron gun weighing nearly 5 tons was made, and in 1588 the Spaniards armed their Armada with cast-iron guns as well as with the more familiar bronze weapons.

When, many years later, it was found that cast iron was the most suitable starting-point for the manufacture of iron and steel, the demand for it increased rapidly. In 1800 the United Kingdom produced about $\frac{1}{4}$ million tons of pig iron, a quantity that in 1913 had increased to a maximum of more than 10 million tons. In 1925 it had fallen to little more than 6 million tons—the aftermath of the War.

Structural Features of the Earth.¹

ARGAND'S distinguished services in unravelling the structure and history of the Pennine Alps, and of the Alps in general, ensure a respectful hearing for his present wider venture. Wide it undoubtedly is, for its seemingly ample title, "La tectonique de l'Asie," in no way contains it. Asia furnishes the text, the subject is Suess's own, the face of the earth.

It is interesting to find de Margerie, who did so much to secure recognition for Suess's masterpiece, acting as godfather to the new arrival. Argand explains that the basis of his memoir is a manuscript map, of which he prepared a first draft in 1912. The following year, de Margerie introduced this map to the notice of the Canadian meeting of the International Geological Congress, and since then has done all in his power to secure its publication. The Belgian meeting, 1922, promised us the map. The memoir,

¹ "La tectonique de l'Asie," *Compt. rendus, Congrès Géol. Internat., Session xliii, 1922*: Belgique, 1924. By E. Argand. Pp. 171-372 (Contents, pp. 365-372), Figs. 1-27.

at any rate, is in our hands. In acknowledging his debt to de Margerie, Argand admits that he could not have faced the task without the help of this 'prince de la bibliographie.' Where so much is given, it may seem churlish to grumble, but many a student will miss any attempt at a considered bibliography in connexion with Argand's memoir. Perhaps the author felt that, when one writes of the world, the catalogues of libraries are themselves the bibliography.

Argand considers that modern knowledge requires a modification and extension of Suess's achievement, not a reconstruction. He starts by adopting Bertrand's *time-definition* of mountain building, employing it in a somewhat elastic sense: the Caledonian Cycle of mountain-building belongs to Lower Palaeozoic times; the Hercynian to Upper Palaeozoic times; and the Alpine to Secondary, Tertiary, Quaternary, and Recent times.

The deformations produced by horizontal pressure acting during any particular cycle are of several

different kinds. Argand employs the following classification—the particular examples quoted belong to the Alpine Cycle :

(1) Deformation of thick comparatively unconsolidated marine sediments. This gives rise to *coastal chains*, such as girdle the Pacific Ocean, and to *geosynclinal chains* (generally double), represented by the great series that reaches from the Himalayas, by way of Persia, Anatolia, and Greece, through the Carpathians and Alps, and so into Spain. The Indo-African-Eurasian geosynclinal series unites with the Asiatic coastal series in the Malay Archipelago.

(2) Continental deformations that affect the foundations and cover of continental areas. The foundations of a continent consist of sediments compacted by some early cycle of mountain building (along with batholithic intrusions). The cover is the veneer of relatively unconsolidated sediments locally deposited on the foundations in epicontinental seas, fresh-water lakes, etc. *Foundation folds*, or *plis de fond*, may reach from any depth up to the surface. Where cover exists, it may be bent along with the foundation, and so give rise to one type of *cover fold*. Another type is exemplified in the Jura mountains, where cover has parted company with foundation.

Argand attributes very great importance to foundation folds. Their existence can be detected in a variety of ways. In Scandinavia it is the *present* height of the mountain chain that betrays its Alpine date. The Alpine fold responsible for the elevation (or re-elevation) is of so great a radius of curvature that it escapes purely geological search—all the readable folding and thrusting in this district are admittedly Caledonian. In the Pyrenees, Caucasus and Thianshan, matters are easier for the geologist. These chains consist of groups of accentuated foundation folds that have broken into semi-rigid nappes, and have involved very considerable thicknesses of post-foundation cover. Many foundation folds, and these, the more important, are a direct expression of the

same push as makes the geosynclinal folds. Others, like the Mt. Blanc massif, have been produced indirectly through interaction with geosynclinal folds.

In his more definitely theoretical pages, Argand adopts Wegener's hypothesis of continental rafts of sial drifting upon sima. Geosynclines are intra-continental regions characterised by thick marine sedimentation. Their site is generally determined by a tendency for two parts of a continental complex to drift asunder. The connecting sial stretches, and as it stretches, its upper surface sags and thus provides a trough for the sea and its sediments, while its lower surface rises, followed by underlying sima. So long as the stretched connecting sial holds together, the subsidence is geosynclinal. Where the sial parts, the subsidence becomes oceanic. Eurasia and Indo-Africa have passed through long periods when they tended to drift apart. Such periods have seen the growth of the geosynclinal sea known to geologists as the Tethys, of which the Mediterranean is the latest recrudescence. During other periods, the two continental masses have tended to drift together, and have squeezed up geosynclinal mountains, that include the Himalayas of to-day as a supreme example.

One might continue this summary indefinitely, and discuss the making of the Mediterranean or the bow and stern phenomena of drifting continental rafts as exhibited along their oceanic margins. Space forbids. Let us merely recall the advice given to young Darwin preparing for his voyage on the *Beagle*. Lyell's "Principles" had just appeared. "Get the book," said orthodox old Henslow, "study it, but don't believe it." Argand has succeeded in correlating an enormous number of geological phenomena, and has thus given them a realisable unity. It may be wise, for the present, to consider his co-ordinating principles with a perfectly open mind ; but this should not render us any the less grateful for the accomplishment of a singularly arduous and helpful piece of research.

E. B. BAILEY.

Obituary.

SIR STEWART STOCKMAN.

IN the debate on foot-and-mouth disease in the House of Lords on Thursday, June 3, Lord Bledisloe, Parliamentary Secretary to the Ministry of Agriculture, said that Sir Stewart Stockman, Chief Veterinary Officer to the Ministry of Agriculture, had died on Wednesday in Scotland, and Sir William Leishman, chairman of the Foot-and-Mouth Disease Investigation Committee, had died in London. In both cases the Ministry had lost very able research workers and administrators, and the loss, so far as his department was concerned, was a very serious one.

Stockman's name will be readily connected with the drastic action taken in Great Britain during recent years, at enormous expenditure, in dealing with the menace of foot-and-mouth disease by the 'stamping out' process—a method of disease control obviously impracticable to the epidemiologist, but in certain circumstances the proper means of combat in the face of epizootic diseases. Although in its application crude, *primâ facie*, consisting in the wholesale slaughter of

known infected and all possibly contaminated animals, the policy of 'stamping-out' as understood by epizootologists is the rationally correct mode of attack when no other system can be readily applied or is likely to be efficacious, and the cost of the process is estimated to fall most decidedly below the losses to the community that will most certainly occur without resort to the method. It is by the adoption of the 'stamping-out' system that the cattle population of England was effectively cleared of formidable scourges in the shape of cattle-plague (rinderpest) and contagious pleuropneumonia during the latter half of the last century, and the same method was applied to foot-and-mouth disease, with, when one compares the incidence of this disease in neighbouring continental countries, most salutary influence upon the live-stock industry of the country.

During this period the disease has reappeared from time to time, usually for some mysterious reason, among our herds, but has been dealt with consistently in the same manner. Within the last few years, how-