eases. The author's work on the anatomy of the house fly began at the University of Manchester in 1905. A very satisfactory monograph which he published in 1907–8 is largely incorporated in the present work. On the subject of the muscular structure of the larvæ particularly, the contribution Dr. Hewitt makes is important. Previous writers generally have passed over this subject lightly. In fact the anatomy of the larvæ of insects has received but little attention. The principal previous work referred to the larva of the goat moth and was published in 1762. There are few investigators qualified to do such work on anatomy as has been done by Dr. Hewitt. His account not only widens our knowledge of insect structure, but corrects many errors which have been made by less competent observers.

The subject of the rôle of the house fly in the dissemination of disease is an extremely complicated one. It is not sufficient to determine the presence of pathogenic bacteria on the fly. Immediately questions of the viability of the bacteria and the habits of the fly must be considered before the actual importance of the insect in disseminating the germs can be considered settled. On this subject in the last few years masses of articles of the most diverse kinds have appeared. Dr. Hewitt analyzes the evidence and treats it in a conservative and judicial manner. His conclusions will undoubtedly be fully substantiated in the course of time. Even since the book was published much corroborative evidence has been supplied.

The book is written in a clear and effective style, is well balanced, well illustrated and altogether in keeping with the high reputation which the author enjoys.

W. D. Hunter

CONTRIBUTIONS TO MINERALOGY AND THE MINERAL SPRINGS OF JAPAN

The Japanese publication *Beiträge zur Mineralogie von Japan,* so ably conducted by Professor Tsunashirô Wada, offers in its fifth number, recently issued, several valuable contributions to the mineralogy of the Japanese empire. Although the title of this publication is in German, all of the articles, with the exception of some in the first number, have been written in English.[1]

Of especial interest is the first paper, by Nobuyo Fukuchi, "The Minerals of Chôsen (Korea)." It presents a summary of about sixty mineral species that have so far been discovered in Korea, among them the following precious stone materials, although hardly of gem-quality: garnet, beryl (?), tourmaline and zircon, as well as rock crystal, smoky quartz, amethyst, rose quartz, etc. Large quartz crystals, of a peculiar reddish hue due to inclusions, have been found at Hukuganzan, Keishô-nando, as have also amethyst crystals. Smoky quartz occurs at several places near Keishû, Keishô-hokudô, and in this region are rock crystals affording good material for lenses. Gold placers and gold veins occur at several places; one large nugget weighing about 915 grams (nearly 30 ounces) was found near Tansen and is noted in the *Journal* of the Geographical Society of Tokyo for 1912. Limonite, the chief iron ore of Korea, occurs in four places: The Kaisen iron mine in Heïan-hokudô; and the Inritsu, Sainei, and Kenjiho mines in Kokai-dô. Garnet has been found in the Suian gold mines in Kokai-dô and in the Inzan gold mines in Heïan-hokudô; columnar crystals of zircon occur in a graphite deposit at Jidô, Heïan-hokudô; and black tourmaline is found near the Sakushû gold mines, Heïan-hokudô, and at two other localities. The occurrence of graphite in the Gneiss system and the Korean system or in old Paleozoic sediments in Korea is also studied by Nobuyo Fukuchi. The graphite veins frequently consist of two symmetrical halves of similar structure with a boundary line between them, and graphite deposits of this type are of great purity and particularly valuable from an economic standpoint. The veins are believed to owe their formation to dissociation from neighboring graphite nests, caused

[1] *Beiträge zur Mineralogie von Japan,* ed. by T. Wada, No. 5, November, Tokyo, 1915; 101 pp., plate; pp. 207–305 of continuous pagination.

by the heat of the granite magma or by emanation gases.

Other papers are: "A Monoclinic Prismatic Sulphur from Reisuiko in Taiwan," by Masakichi Suzuki; "Studies on some Minerals of Japan," by Mikio Kawamura, giving a thorough exposition of the optical properties of danburite from Obira, Province of Bungo; "Epidote Crystals from Katakai in Sasaharamura, Province of Iwaki," by Kinzô Nakashima; "Ferberite from Kurasawa in the Province of Kai; and Hübnerite from Nishizawa in the Province of Shimo-tsuke," by Kotora Jimbô.

The description of two aragonite cones from a liparite region in the gold district of Kuriyama, by Watanabe (pp. 237–241, plate), illustrates two interesting examples of these cone formations at the outlet of geysers. One of these Kuriyama geysers emitted 4.26 liters of colorless hot water per minute, the temperature being 94° C.; about 44 grams of carbonate of lime are deposited in twenty-four hours, something like 4½ per cent. of the amount in the water. The cones are blunt-ended, and composed essentially of lime carbonate with a trifling admixture of sulphur. An interesting fact is the calcite structure of the inner or older part of these cones, in contrast with the very minute hexagonal columns of aragonite terminated by the basal pinacoid, forming the loose inner part of the lower portion of the cone. One of these specimens (Plate X., Fig. 1) was formed between August 26, 1907, and June 25, 1908; it is 30 cm. high, the diameter at base being the same; its weight is 13.878 kg.; the canal is not strictly vertical, but rather oblique. The second example (Fig. 2) has two canals, its dimensions being: height, 24 cm.; diameter at base 30 cm. According to local tradition a cone about 1½ meters high once stood at the same spot.

The precious opal of Hôsaka is briefly noted by Yônosuke Ôtsuki (pp. 274, 275). The locality lies in the upper course of the rivulet Kikôzugawa, which flows between the village of Hôkawa and the mountain-pass Kurumatôge. The opals are found within nodules (silicified spherulites) enclosed in a green-black pearlite which turns gray in weathering. The nodules are usually from 3 to 5 cm. in diameter, although some measure as much as 18 cm. across; they are brownish or black, resembling potatoes in shape, good opals coming more frequently from the brown than from the black nodules. The opal-material is here present in great variety: milk opal, opal-agate, precious opal, glass opal, as well as the smoky, obsidian-like variety, the yellowish-green, the waxy and others. Important is the granulated appearance of some specimens when viewed in a particular direction, the granules offering one interference color by incident light, while the cement assumes a different color. The specific gravity of the precious opal is 2.22, its hardness 5.5 and its aqueous content 8.49 per cent.

Crystals closely resembling the jarrowite from the Clyde-Estuary in Scotland have been found in Chinano province, Japan; to these have been given the name, *gennô-ishi,* or hammerstone.[2] Both are judged to be pseudo-gaylussite, or calcite after gaylussite, the peculiar shape having led anthropologists to designate such crystals "stone-axe." The *gennô-ishi* crystals of Shinano province are acute pyramidal or prismatic with very rough, curved surfaces. There are deep parallel striations on the crystal faces, perhaps sutures of oscillating combination, and also many small sub-crystal protuberances, placed in parallel order; it seems that sometimes a crystal was formed by an aggregation of many of these parallel individuals.

In color the Clyde crystals differ somewhat from the Japanese, the former being deep brown with resinous luster and the latter light brown with a like luster. A comparison of the chemical composition is given by the following analyses, there being a considerable undetermined residue in the case of the Shinano crystals and in Clyde No. I., which may represent organic matter.

[2] Tadusu Hiki, "On the Genô-ishi"; reprint from the Memoirs of the College of Engineering, Kyôto Imperial University, Vol. I., No. 2, Kyôto, 1915; plate.

	Shinano	Clyde	
		I	II
SiO_2	0.64	0.12	.....
Fe_2O_3	3.44	5.36	.....
Al_2O_3	1.00	0.12	.....
CaO	52.33	46.60	47.63
MgO	0.48	4.94	4.21
CO_2	37.00	36.40	39.91
P_2O_5	.....	.....	2.23
Organic matter	.....	.....	5.94
	94.89	93.54	100.22[3]

An exceedingly comprehensive work on the mineral springs of Japan has just been published by Dr. R. Ishizu, expert of the Imperial Hygienic Laboratory at Tokyo.[4] No less than 1,201 of these springs are tabulated, and a very large number of analyses are given, as well as tables of the radioactive springs of Japan, and of the leading European springs of this interesting class. Part III. offers notes on prominent spas and resorts. The numerous plates illustrate the scenic beauties of the various localities.

George F. Kunz

SPECIAL ARTICLES

ANTAGONISTIC ELECTROLYTE EFFECTS IN PHYSICAL AND BIOLOGICAL SYSTEMS[1]

The purpose of this paper is to summarize briefly certain experiments regarding the influence exerted by antagonistic electrolytes on emulsions and other physical systems, and to compare the data in question with those available regarding the influence exerted by the same antagonistic electrolytes on living cells, in an attempt to throw some light on the physical structure of protoplasm and the mechanism of certain vital processes.

In spite of the accumulation by Jacques Loeb, and other biologists, of a large amount of accurate experimental data regarding the effects exerted by electrolytes, singly and in combination, on living cells, there is, at present, no generally accepted physical explanation for the antagonistic or compensatory effects exerted by electrolytes on one another in biological systems.

In a preliminary communication published in 1913 based on certain physical and biological experiments, details regarding which will be found in a subsequent section of this paper, it was concluded that, with certain exceptions to be considered later, electrolytes may be divided, as regards their effect on the protoplasmic membrane, into two main antagonistic groups according to whether, like $CaCl_2$, they possess a more readily adsorbed or reactive cation, or, like NaOH, NaCl, etc., a more readily adsorbed or reactive anion. Substances of the former class appear to diminish the permeability of the membrane to water, while those of the latter class increase the permeability of the membrane. As will be seen later, the ratios in which antagonistic electrolytes counterbalance one another in biological systems correspond so closely with the ratios in which they balance one another in physical systems as to suggest the probability that balanced electrolyte solutions, like sea-water and the blood of mammals, are those in which the proportions of cations and anions adsorbed on or reacting with the protoplasmic membrane are equal, or at least compensatory, with the result that the colloidal equilibrium, and consequently the permeability of the membrane, remains unchanged. A somewhat similar conclusion was reached by Osterhout as a result of experiments on the electric conductivity of laminaria tissues. Under comparable experimental conditions the tissues which had been exposed to sea-water exhibited a practically constant resistance to the passage of an electric current, but, after exposure to solutions of

[3] The summation is .30 in error, which exists in the manuscript.

[4] "The Mineral Springs of Japan," with tables of analyses, radioactivity, notes on prominent spas and list of seaside resorts and summer retreats, specially edited for the Panama-Pacific International exposition, by Dr. R. Ishizu, expert of the Imperial Hygienic Laboratory, Tokyo Imperial Hygienic Laboratory, 1915, x + 94 + 203 + 70 + 8 pp., maps and illust., and 76 plates, folio.

[1] A summary of a paper read before the Biological-Chemical Society, Boston, Mass., December 28, 1915. Received for publication December 29, 1916. Publication delayed on account of necessity of condensation within suitable dimensions for this journal. (From the Biological-Chemical Laboratory of the State Institute for the Study of Malignant Disease, Buffalo, N. Y.)