breeding grounds of the Pribilofs are located largely upon rocky ground or upon firm soil and have sufficient slope as a rule to prevent the accumulation of sand. There are small sand patches within the limits of several rookeries which are infested with the parasite *Uncinaria*. This hook-worm is one of the contributing causes to heavy annual losses among the young seals born on sandy areas. The *Uncinaria* parasite was doubtless a greater source of danger in former years than at present. It was, like the fighting of the males, a natural check upon the unlimited expansion of the seal herd, but not so potent. The topography of some of the rookeries is such that an extension of their limits would force the breeding females to occupy unfavorable sandy areas. This source of danger to young seals can be eliminated, if sandy ground is covered with rock, or fenced in so that breeding seals can not occupy it.

In conclusion it may be stated that with our present knowledge of the life history of the fur seal, there is no reason why our valuable herd should not only rapidly increase in size, but, under wise management, *actually exceed in numbers* the great herd occupying the Pribilof Islands at the time of their discovery.

The principal thing in the management of the rookeries will, however, be the limiting of the number of the adult males allowed to enter the rookeries.

Notwithstanding the fact that during recent years a very large proportion of the surplus males has been killed for profit, our annual photographic records show that there has always been, with the exception of one or two seasons, a sufficient surplus of idle males adjacent to each rookery. Such animals force their way in as soon as they acquire the weight and the courage necessary for them to do so. All claims that we have killed too many of the surplus males can easily be disproved by the photographic records of the Bureau of Fisheries.

C. H. Townsend,
Member of the Advisory Board of the Fur Seal Service

BOTANICAL NOTES

FURTHER STUDIES OF THE COCONUT

In a recent paper[1] O. F. Cook publishes the results of his further studies of the coconut. It will be remembered that some years ago he published his first considerable paper on this tree, in which he showed among other things that the name is coconut, as spelled above, and not cocoanut, the dictionary makers to the contrary, notwithstanding. The particular purpose of the present paper appears to be to prove the American origin of this tree, and this the author seems to have done most conclusively. The conclusions may be summarized as follows:

All palms that are related to the coconut (about 200 species, of 20 genera) are American, with possibly one exception. All species of the genus *Cocos* are South American. The most nearly related species are natives of the interior valleys and plateaus of the Andes, where the coconut also thrives, remote from the sea. Neither structure nor habits of the coconut tree indicate that it originated on the seacoast. Moreover, it is not able to maintain itself under littoral conditions without the assistance of man, and is always crowded out by other vegetation after human care is withdrawn.

"The dissemination of the coco palm along tropical coasts is to be ascribed to primitive man." "The theory that it has been disseminated by ocean currents is gratuitous, unproved and improbable." The long-accepted theory as to the essentially littoral habitat of the coconut must be abandoned in favor of one quite the opposite. "The unusually large, heavy seed and the thick, fibrous husk are to be considered as adaptations for protecting the embryo, assisting in germination, and establishing the young plants in the dry climates of interior localities, the only conditions where this palm could be expected to maintain its existence in a wild state."

"PECK'S REPORTS"

Another of the well-known reports of the state botanist of New York came to hand a

[1] Contrib. U. S. National Herbarium, Vol. 14, Pt. 2.

few days ago, adding one more to the long series, now more than forty, that Professor Peck has prepared. One can not help a feeling of admiration for the regularity with which these reports have appeared, each with its contribution of "plants added to the herbarium," "contributors and their contributions," "species not before reported," "new species and varieties," etc. When the writer of this notice was a young college instructor "Peck's Reports" were for him a source of help and inspiration, as he strove laboriously and painfully to know something of the fungus flora of the middle west. Do the young mycologists of to-day prize these New York State Museum reports as much as did those of the 70's and early 80's? The present report contains a monograph of the New York species of the genus *Hypholoma,* and a similar monograph of the genus *Psathyra.* Four good colored plates of the larger fungi are included, two being of edible species.

THE FORESTS OF THE PHILIPPINES

A MOST promising beginning has been made in our knowledge of the forests of the Philippine Islands in the report made by Dr. H. N. Whitford, to the Director of Forestry, Major George P. Ahern, and issued as Bulletin 10 of the Philippine Bureau of Forestry (1911). It consists of two parts, separately printed, as Part I., devoted to Forest Types and Products, and Part II., The Principal Forest Trees, each of about one hundred pages. In his introduction the author says, "The object of this bulletin is to bring together the most important facts concerning the forests of the Philippines and the exploitation of their products." Rough reconnaissance work on a large scale, and rough cruising over large areas, with intensive valuation surveys over certain small selected stands have afforded the data upon which the report is based. The author feels that his results are conservative and fairly reliable.

The family of plants of the greatest importance in its growth of trees is the *Dipterocarpaceae,* and "it is estimated that the dipterocarps include about 144,000,000,000 out of a total of 200,000,000,000 board feet of standing timber in the islands." When we remember that the number of species of trees of all kinds on the islands is placed at about 2,500, the significance of this dominance of the dipterocarps may be appreciated. It is thought that not all of the species of dipterocarps have been described. The trees of many of the species are small, the author citing one case where he collected 80 different species on one acre, and of them but two species attained to "merchantable size."

It is interesting botanically to learn that "more or less ill-defined rings of growth are associated with those species that are wholly or partly deciduous and which are intolerant of shade."

In one paragraph he says "there is little question that practically the entire land area of the Philippines, from sea level to the highest mountains, was originally covered with unbroken forest growth of some kind," and it is estimated that approximately one third of the area is still covered with virgin forests that have never been disturbed. About one sixth of the area has grown up to second-growth forests, making a total of fully one half of the area of the islands in forests. Of the other half probably 10 per cent. of the whole area is under cultivation, the remainder (40 per cent. of the whole) is now in grass lands. These grass lands are kept so by repeated fires which kill all seedlings of woody species, much as occurs upon our own prairies.

Speaking of the dipterocarps the author says that "practically all the species are large trees, reaching heights of 40 to 50 meters, and diameters of 100 to 150 centimeters or more, and it is not rare to find even these dimensions exceeded. They have straight, regular poles, resembling in size and shape the *Liriodendron tulipiferum* (yellow poplar or tulip tree) of the United States."

Many good plates (over 130) and a good map of the islands add greatly to the usefulness of the report. Every botanist who has any interest whatever in forestry will wish to add this report to his library.

PLANT PROTECTION

Recently there came to hand a little book by Sorauer and Rörig under the title "Pflanzenschutz," which should be duplicated in this country. In about 200 pages the authors tell how to recognize and combat various injurious fungi and insects of commonly grown plants. Fifty-eight text figures and seven colored plates add to the usefulness of the book for farmers and non-technical readers. The book was issued by the German Agricultural Society, which is a hint to our similar societies.

SHORT NOTES

Among recent small books worthy of note is Geddes and Thompson's "Evolution" (Holt), which presents in about 250 duodecimo pages a summary of the great features of the doctrine of descent. An enumeration of the chapter headings will suffice to give the reader a good idea of the scope of the little book. These are (1) Evidences of Evolution from Explorer and Palaeontologist; (2) Evidences of Evolution from Anatomist, Embryologist and Physiologist; (3) Great Steps in Evolution; (4) Variation and Heredity; (5) Selection; (6) Organism, Function and Environment; (7) Evolution theories in their Social Origins and Inter-Actions; (8) The Evolution Process Once more Reinterpreted; Bibliography.

Mrs. Flynn's "Flora of Burlington and Vicinity" will interest field botanists of the older type. It includes the names of all the vascular plants in the vicinity of Burlington, Vermont, and is based upon specimens in the herbarium of the University of Vermont. The seventh edition of Gray's Manual is strictly followed in matters of nomenclature. The species admitted are 1,240, of which 962 are strictly native, while 278 are foreign, but "growing without cultivation." While distinctly old-fashioned, and not at all tinctured with any ecological fads, the list will be a handy one for botanists who wish to know what species occur in the area covered.

Among recent papers on Philippine botany are C. B. Robinson's monograph of Philippine Urticaceae, which appeared in the December (1910) and February (1911) numbers of the *Philippine Journal of Science*. It covers somewhat more than a hundred pages and includes generic and specific keys, with Latin diagnoses of the new species. The total number of species included is stated to be 129, distributed among 21 genera.

In the June number of the *Philippine Journal of Science* C. B. Robinson contributes a most interesting paper on "Philippine Hats," dealing primarily with the materials used, and secondarily with their manufacture. The plants used include three ferns (species of *Lygodium*), eight species of *Pandanus*, five species of grasses, two sedges, six or more species of palms, and one species each of *Musaceae, Marantaceae, Orchidaceae, Moraceae, Leguminosae, Sterculiaceae* and two of *Cucurbitaceae*.

In the same number of the *Journal* E. B. Copeland makes a report upon a collection of Papuan ferns received from Reverend Copland King, of Ambasi, Papua. All told they number 171 species, representing 58 genera. Two new species of *Marattia* are described. The genera with considerable numbers of species are: *Lygodium* (7), *Trichomanes* (11), *Hymenophyllum* (6), *Dryopteris* (16), *Tectaria* (8), *Athyrium* (7), *Asplenium* (12), *Pteris* (7), *Polypodium* (16). Forty-two new species are described, and three new genera, all very properly with Latin diagnoses, in accordance with the Vienna Code.

After a careful study of the testimony Professor Dr. D. H. Campbell concludes (*Am. Nat.*, January, 1911) "that graft-hybrids are possible." He bases his conclusions largely upon the results reached by Professor Winkler of Tubingen. It appears that when two plants of different species are mechanically united, as in grafting, this may result in a "chimaera" (as though two vertical fragments of the different stems with their leaves were united longitudinally), or in a real hybrid arising from a fusion of two somatic

cells derived from the two distinct species. Between these two extremes there are many intermediate forms. The hybrids arising from the fusion of cells behave very much like sexually produced hybrids, even to the number of chromosomes in the hybrid cells.

DR. CAMPBELL'S studies of the "Embryo-sac of Pandanus" (*Ann. Bot.*, July, 1911) brings out the fact that at the time of fertilization of the egg there may be present as many as 64 antipodal nuclei, in addition to the usual egg apparatus at the micropylar end. This he regards as a primitive condition, or in other words as an older type of embryo-sac which has survived to the present.

THE new botanical periodical *Zeitschrift für Botanik* (Fischer, Jena), now in its third year, is proving to be a useful addition to the already long list of botanical journals. Its editors are Professors Jost (Strassburg), Oltmanns (Freiburg) and Solms-Laubach (Strassburg). Recent numbers contain papers as follows: "Contributions to our Knowledge of the Laminariaceae" (by Killian), "On the Development of Basidia in Uninucleate Mycelium of *Armillaria mellea*" (Kniep), "On the Reduction-division in the Zygotes of *Spirogyra*, and of the Significance of Synapsis" (Tröndle) in addition to many brief reviews, and classified titles of new literature.

CHARLES E. BESSEY
THE UNIVERSITY OF NEBRASKA

SPECIAL ARTICLES

PHOSPHORUS METABOLISM DURING EARLY CLEAVAGE OF THE ECHINODERM EGG[1]

IN his recent book on artificial parthenogenesis Professor Loeb[2] assumes that during cleavage of the ovum there is a progressive synthesis of nuclear material from constituents of or reserve substances in the cytoplasm. This assumption is based primarily on the observation of Boveri that following each cell-division there is a growth of the daughter-chromosomes in each resultant cell until their mass is approximately equal in each case to that of the original mother-chromosomes; in other words, the mass of nuclear material increases in a geometric ratio as cleavage progresses. The following observations are also brought forth by Loeb in support of this hypothesis of nuclein synthesis: "Miescher found that the lecithin content of the blood of the salmon was relatively high during spermatogenesis and mentioned the possibility that lecithin might furnish a building material for the nucleinic acid of the spermatozoon head. What is therefore true of the building of nucleinic acid in the spermatozoon is assuredly true also for the building of nucleinic acid in the egg. Hoppe-Seyler has mentioned the fact that all young, quickly growing tissues contain relatively large quantities of lecithin. This is especially true in the case of the ovum. The researches of Kossel have shown, on the other hand, that the yolk of hens' eggs contains no preformed nucleinic acid and the same has been shown to be true for the yolk of silkworms' eggs by Tichomirow. Since there is in the egg after fertilization a rapid synthesis of nuclear material at the expense of certain constituents of the protoplasm or of the yolk, since the latter is rich in lecithin which disappears during nuclein synthesis, it is allowable to suppose that lecithin supplies part of the material for the nucleinic acid."

It may be pointed out that this supposed use of lecithin is not consistent with the idea advanced by Overton,[3] Koch[4] and others that this substance among other lipoids plays an important rôle in the limiting membranes of many animal cells. It would seem indeed that as cleavage progresses more rather than

[1] I am indebted to the Commissioner of Fisheries, Hon. Geo. M. Bowers, for the facilities afforded; and to the director of the Beaufort Laboratory, Mr. H. D. Aller, for many personal courtesies extended to me during this work. Dr. E. P. Lyon has aided me greatly with suggestive criticism.

[2] Loeb, "Die chemische Entwicklungs-erregung des tierischen Eies," p. 18 ff. Berlin, 1909.

[3] Höber, "Physikalische Chemie der Zelle und der Gewebe," p. 114. Leipzig, 1902.

[4] Koch, *Zeit. f. Physiol. Chem.*, B. 63, S. 442. 1909.