However, when the grains are milled, the resulting flour used as human food and the offals given to cattle and sheep, then between 56 and 81 per cent. of the energy in the grain is recovered as food for human beings, whereas when the same offals are given to pigs and dairy cows between 60 and 85 per cent. of the energy is so recovered. It is evident that food is best conserved for man when edible grains are taken to the miller and the bran is used in meat production. Armsby shows that there is a considerable loss of energy in the food when barley is used in brewing and corn or rye in distilling. If one assumes that alcohol is without food value, then the waste is very large even though the brewers' and distillers' grains are used as fodder for pigs or dairy cows. The details given in the book are of greatest interest to those conversant with the food situation as a whole.

Graham Lusk

THE FLORA OF NORTH DAKOTA

Less than twenty years ago the first catalogue of the vascular plants of North Dakota was published.[1] Now we have a revision of the list in the form of a flora[2] which follows the plan of the well known floras of Colorado and of Washington. The introductory portion (pp. 151–174) contains a review of botanical collections in the state (3 pages), physiography of the state (6 pages), types of vegetation and their distribution (7 pages), and of plant classification with chart showing the evolution and relationship of families. The main portion contains keys to families, genera and species with citations of specimens and notes on habitat. For many species additional notes referring especially to variation of the species and its resemblance to others are given. These form one of the most valuable portions of the work. A glossary and index follow. A report by the same author on the plants of Barnes County is included in the same volume.

The arrangement of families is that of the Bessey system and the nomenclature is said to be in accordance with the Philadelphia code. A conservative stand is taken in regard to species and genera recognized. Synonyms are used freely and the reasons for reduction of segregates are stated in most cases.

Typographical errors seem to be few but one feature of the press work is particularly unfortunate. The generic and specific names in the keys are placed beyond the body of the text at the expense of the margin, especially that of the left hand side of the page. Italics are used for these names and small capitals for the generic headings, otherwise there is no distinction in type.

North Dakota is to be congratulated upon the completion of a work of as high standard as this. The simplicity of the keys, the glossary, introduction and descriptive notes will contribute much to its value to the people of the state. Notes on the flowering period would have been a valuable addition. Botanists will be especially interested on account of the geographical position of the state, situated as it is in territory not entirely covered by either eastern or Rocky Mountain manuals.

The introduction of Clement's flower chart is an excellent feature. Compared with the one in Clement's "Rocky Mountain Flowers" it seems to have been considerably improved by substituting simple symbols for the structural formulæ and especially by adding apetalous families and methods of pollination.

The writer of this review wishes to state that he has in preparation and hopes to publish shortly a paper which will bring together additional records accumulated since the close of Mr. Bergman's work with such other notes as seem worthy of inclusion.

A catalogue[3] of the plants of the state has

[1] Bolley, H. L., and Waldron, L. R., "A Preliminary List of Seed-bearing Plants of North Dakota," Bul. No. 46, N. D. Exp. Station, 1900.

[2] Bergman, Herbert F., "Flora of North Dakota," Sixth Biennial Report, Agr. College Survey of N. D., pp. 151–372, 1911–1912 (pub. September, 1918), The Bismarck *Tribune*, State Printers. The complete report of flora only may be obtained from Herbert A. Hard, Fargo, N. D. Postage 20c. Report in cloth 25c.

[3] Lunell, J., "Enumerantur Plantæ Dakotæ Septentrionalis Vasculares," *Am. Mid. Nat.*, Vol. 4–5, July, 1915–July, 1917 (reprints paged 33 to 188; first 32 blank).

been published recently. In this list citations of specimens are chiefly to the herbarium of the author which has resulted in showing a very limited distribution for a great part of the species. Some descriptive notes are given and occasionally a key to species. Among the latter is one of *Carex* contributed by Mackenzie.

Specific limits are closely drawn and subspecies are numerous. Eight new species and thirty-five subspecies are described. The nomenclature which is based upon absolute priority, is worked out with the assistance of Dr. J. A. Nieuwland, and entails changes in over 230 of the 1,246 names on the list. Fifteen new names are proposed for genera and a considerable synonymy is given.

Changes in names are unpopular with many people and narrow limitation of species yet more. But is not the "splitter" entitled to a certain measure of credit? Not infrequently do some of his discoveries become accepted, even by the conservative. Radical movements have ever resulted in notable advances in some respect. Among cultivated plants we have races of greatly different values which are scarcely separable by the smallest descriptive characters. The describer of new forms has at least brought new facts to attention of others. If variations in plants can be shown to the result of certain conditions, our knowledge has advanced. This seems to be one of the great fields for botanical investigation at the present time.

A first list of fungi[4] of the state has just been completed. This list includes nearly 900 species distributed as follows: Phycomycetes, 22; Ascomycetes, 271; Lower Basidiomycetes, 161; Higher Basidiomycetes, 119; Fungi Imperfecti 119. The completion of this notable contribution is especially fortunate since the author, formerly a physician at Kulm, N. D., is now in the military service. His work is already known through his "Fungi Dakotenses" of which eighteen fascicles of twenty-five numbers each had been issued. In the course of his work many new species have been described, chiefly by Rehm and Saccardo. These are indicated in the list by the designation "n. sp." but no reference is given to place of publication. One new species is described, *Hendersonia Cratægi.*

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[4] Brenckle, J. F., "North Dakota Fungi," *Mycologia,* Vol. 9, pp. 275–293, 1917; Vol. 10, pp. 199–221, 1918.

SPECIAL ARTICLES

PEAR BLIGHT WIND BORNE

WAITE[1] in 1891 proved that bees were able to transmit the bacteria of pear blight from flowers and in this way spread the disease. Of recent years several important papers have appeared which demonstrate clearly that certain other insects can act as carriers or agents of transfer. The number of insects which have now been convicted is quite large. The list includes *Adelphocoris rapidus* Say,[2] *Aphis avenæ* Fab.,[3] *Aphis pomi* De Geer,[4] *Campylomma verbasci* Mey,[2] *Empoasca mali* Le Baron,[3] *Lygus pratensis* Linn.,[5] *Orthotylus flavosparsus* Sahlberg,[2] *Plagiognathus politus* Uhler,[6] *Pœciloscytus basalis* Reuter,[2] *Scolytus rugulosus* Ratzeburg.[7]

Notwithstanding the fact that it is thus clearly demonstrated that insects can transfer this bacillus, the question yet remains as to how important they actually are in spreading this disease. While they can evidently transfer the disease are they chief or even important agents in its transfer? In order to make tests bearing on this question two pear trees about four meters high were enclosed last year in wooden frames measuring four meters square on the ground and four meters high. These structures were covered with 14-mesh wire mosquito netting. The intention was to

[1] Waite, M. B., report in Smith, Erwin F., "Bacteria in Relation to Plant Diseases," 2: 55.

[2] Stewart, V. B., and Leonard, M. D., *Phytopathology,* 5: 117–123.

[3] Burrill, A. C., *Phytopathology,* 5: 343–347.

[4] Stewart, V. B., N. Y. (Cornell) Agr. Exp. Sta. Bull. 329.

[5] Stewart, V. B., *Phytopathology,* 3: 273–276.

[6] Stewart, V. B., and Leonard, M. D., *Phytopathology,* 6: 152–158.

[7] Jones, D. H., Ontario Agr. College Bull. 176.