tenance deserves all the support that can be extended and, if a zoologist does not care to buy the entire 'Record,' let him secure the portion dealing with his speciality. For the student of ornithology this is the 'Aves' which Dr. Sclater has so carefully prepared.—W. S.

Madon's 'Les Corvides d'Europe.'[1]—This report is the most voluminous that has yet appeared on the economic status of any family of European birds. The author states that he has been studying the subject in his leisure for 70 years which gives him another record. The number of stomach analyses which he contributes to the investigation is approximately 340 distributed among 5 of the 11 species reported upon. Practically all of these birds are considered as more injurious than beneficial, but we believe the author to be a stern judge, making the most of shortcomings of the birds and minimizing their useful services. The work owes its bulk largely to the detailed digest and critique that is made of the results of other investigators.

Except for the last named feature, the reviewer would class the report as a useful compilation of information on the economic relations of the European Corvidae and make little further comment. The rather severe condemnation of the volumetric system of reporting upon the food habits of birds—the basis of practically all American work on the subject,—however, requires some attention. A review is not the place for discussing this matter at length, especially since that has already been done in 'The Auk,' 29, 1912, pp. 449-464. It seems necessary, however, to explain again that users of the volumetric system do not regard it as perfect, nor do they so regard any other system thus far used. In economic reports a great deal depends upon interpretation, a necessity that is not done away with by the use of the numerical (favorite of our author), or any other, statistical method. Equivalent numbers, weights, or volumes, of such essentially diverse materials as compose the food of practically omnivorous creatures do not have equivalent economic values. Their relations must always be explained.

The volumetric system is frankly admitted to be one of rather rough estimates but in the case of long series of stomachs collected in diverse localities, and at all possible seasons, errors are certain to more or less balance, and an approximation to truth be reached. Madon objects that under the volumetric method soft and rapidly digested items of food do not receive the valuation to which they are entitled. He does not mention the converse of this proposition, namely, that under the numerical system the importance is exaggerated of all foods having specially resistant portions. The numerical system cannot be applied to bulk foods as ground up foliage, tubers, pulpy fruits, flesh, or carrion. Being thus incomplete why is it not better to adopt a method that can be applied to all foods?

[1] Les Corvides d'Europe, leur regime, ses relations avec l'Agriculture et la Chasse. L'analyse stomacale des omnivores. Mem. Soc. Orn. et Mamm. France, No. 1, 255 pp.; also published in Encycl. Orn. No. 3, 1928.

Furthermore, counting food items may be and usually is combined with volumetric anaylses so that advantages of both systems are achieved. Birds come much nearer to consuming an average volume of food per day, than they do to taking a certain number of food items, varying as these do, so enormously in size. The report that we can make under the percentage by bulk method that a bird consumes a bushel of may-beetles for every bushel of cherries it destroys, conveys a much more intelligible message to the farmer than would any numerical statement that might be made.

Madon says that the numerical method is the most often used, a very questionable statement if the number of separate publications on bird food be taken into consideration, by far the largest number of which are American and practically all of which employ the volumetric system.

We may briefly refer to some of Madon's inaccuracies which seem chiefly due to lack of experience in stomach analysis. He notes that under the American method "not only the empty stomachs are discarded but also those which are almost so and 'others considered abnormal for various reasons,' but with what right and to what extent?" Discarded in this connection means only rejected from computations of food percentages; the stomach analyses are recorded and the contents preserved for future reference as in the case of all others. Anyone with considerable experience in stomach analysis realizes that in a high proportion of cases abnormal items or combinations of them occur in the nearly empty stomachs. Discarding analyses of such stomachs also does away in great part with an error so pronounced in the numerical system of giving full value to the residues of meals; for instance a large number of mandibles present may represent all of the grasshoppers that have been eaten in a day. The average contents of a bird's stomach, residues ignored, represents approximately a single meal and we obtain the most reliable results by using in our computations only stomachs that conform fairly closely to this average standard. The mandibular residue mentioned, if not discarded, would be reckoned as grasshoppers 100% or a meal of grasshoppers, while if counted and possibly scores of individuals found represented, it would be clear that we were dealing with the remains of several meals, a result not at all comparable to those obtained from the average stomach contents.

"In the small insectivorous birds, one often finds nothing but some of the very finest debris of which the most trained observer could not identify accurately a third." We can only say that this is very seldom the case in analyses by the Biological Survey. Assistance by specialists enables the identification usually of every item in a stomach.

Our author complains of economic classifications, as of lumping all weevils as injurious. The reviewer considers this policy justifiable on account of the potentially noxious character of such groups of vegetarian insects. It is from their ranks that pests arise and new ones are constantly developing. For instance our *Sphenophorus* and *Listronotus* under strictly natural conditions do little to concern mankind, but when we invade their habitat and plant it with stands of maize and rice, they turn to feeding on these

plants, multiply under the very favorable conditions created, and become pests. Similar cases have occurred among other groups of vegetarian creatures.

On the other hand, we believe that Madon errs in classifying all Carabidae, Coccinellidae and the like as beneficial. In the United States the Coccinellids give us two of our greatest beetle pests, the squash beetle and the so-called Mexican bean beetle. The Carabids include the seed corn beetle, and numerous partially vegetarian species. They are by no means all to be ranked with the highly predacious caterpillar hunters (*Calosoma*, *Cychrus*, et al).

How easy it is to be hypercritical as to economic relations is well illustrated by a consideration of these very beetles. Under the American method, we would rank them as beneficial—in accordance with our policy of rough estimates. One like Madon who is so fond of closer analysis should reflect that while the caterpillar hunters have some good to their credit, yet they cannot be wholly good as some of the caterpillars they get feed upon undesirable plants, as weeds. In the present state of knowledge such analysis is not profitable in economic work. We must deal in generalizations. This being the case, technical criticism of the mathematics of economic work, such as fills many pages of Madon's paper, is quite beside the mark. Of what avail is it to have mathematical methods of a high degree of perfection when the quantities they deal with cannot symbolize other than rough approximations to truth?

Madon devotes a chapter (pp. 172-187) to a review of the Biological Survey publications[1] on the food of the crow, in which we note numerous errors. He adds the number of stomachs used in the two investigations, and uses the sum obtained in his analysis of the American results. As a matter of fact the stomach contents used for the first report were re-examined and used in the second so that the total number for both is approximately that given for the second report alone. He says that "corn is the first food given to the young" a statement not supported by the stomach examinations, as Kalmbach writes that "Corn eaten by nestlings less than a week old is practically negligible in quantity." Madon presumes to improve upon Kalmbach's deductions as to the value of the maize consumed, but in combining the results of the two investigations as noted before, he duplicates a large number of the records; he makes unwarranted assumptions as to the length of planting and ripening seasons, and is in ignorance of American harvesting methods which always leave much scattered grain in the fields. There is no doubt, whatever, as American authors have declared, that a great part of the corn consumed by the crow is waste grain the taking of which is, if anything, a benefit to agriculture. The apparent increase in individual maize consumption from the date of the first to that

[1] Barrows, W. B. and E. A. Schwarz, the Common Crow of the United States, Bul. 6, Division of Ornithology and Mammalogy, 1895.

Kalmbach, E. R. The Crow and Its Relation to Man, Bul. 621, U. S. Dept. Agr., 1918.

of the second investigation, which he notes, is due probably not so much to change in habit of the crow, as to inclusion in the second set of analyses of more than 500 stomachs from Corn Belt States as Missouri and Kansas.

Madon's estimate that the number of crows has quadrupled since 1886 is a mere guess; apparently the birds have increased very little in the eastern States, but more in the western States and southwestern Canada where agricultural development has opened up new homes for them.

Madon's comment on egg eating by crows, says nothing of the failure of his pet numerical system to aid in the problem, and like most who argue on the subject fails to admit the fact that (except in regions where the climate permits only one brood) destroying a clutch of eggs or even brood of young of the average wild bird still leaves the bird opportunity to rear young. This fact guides public policy in some places toward colonies of birds, or such species as the eiders and lapwing, a crop of eggs from which is collected annually before the birds are permitted to incubate.

The author makes totally unwarranted deductions as to losses to agriculture (more than hundreds of millions of dollars, he says) due, he claims, to distortion of findings in the first report. Since the first report resulted in no additional protection of the crow, and the public was at liberty to take whatever control measures it pleased (a chapter in Bulletin 6 was devoted to these), even if the losses mentioned were actually suffered which is very doubtful, they could not properly be blamed on anything in Bulletin 6.

Madon's critique of American work on the relations of crows to agriculture, has in places a shrewd aspect, but in others falls into error on account of lack of knowledge of American conditions, and to inexperience in work in economic ornithology. The patronizing tone in places, and assumption of superior knowledge of economic relationships, by one who has examined only tens of stomachs to thousands examined by American investigators is entirely unwarranted. If Madon's work had been confined to presentation of original material and an uncensorius review of other European work it would have been more valuable and acceptable than it is in its present form.—W. L. M.

Further on Birds in the Ecology of Spitsbergen.—In 'The Auk' for January 1924 (Vol. 41, No. 1, p. 191) the reviewer noted a paper by V. S. Summerhayes and C. S. Elton on Spitsbergen and Bear Island that contained interesting material on birds. These authors have again published[1] on the results of their share in the Oxford and subsequent expeditions, and the ornithological findings have a distinctly novel cast. For instance the Ivory Gull, according to the authors, is to the polar bear what the jackal is to the African lion; it subsists almost entirely on the carcasses of seals left by bears. The gull shows extreme reluctance to alight on the water and seems more like a land- than a sea-bird. The assumed protective value of the coloration of the Ivory Gull is questioned.

[1] **Further contributions to the Ecology of Spitsbergen, Journ. Ecology, 16, No. 2, Aug. 1928, pp. 193–268, pls. 24–35, 5 figs., 1 map.**