USEFULNESS OF OUR SONG BIRDS THROUGH SOIL AND VEGETATION.

E. A. ANDREWS.

THAT our song birds destroy insects and weeds and thus often aid us in the rearing of food supplies has been so often emphasized that it seems quite unusual for the emphasis to be placed not upon this utility but upon the esthetic benefits to be got from preservation of our feathered friends as has recently been done in the excellent 'Bulletin' of the Board of Game Commissioners of Pennsylvania where we read: "Are we never to realize and admit that our most sincere reason for protecting birds is simply that we want them as they are about us, whether they are each saving our state so many cents apiece annually or not?"

Granting this, it may not yet be amiss to call attention to a possible usefulness of our song birds that has not been stressed, namely, their aid in the supply of food for plants, plants in general, which though like insects are not all directly beneficial to man, yet unlike insects are fundamental constructors of what all animal life needs.

Those who keep Canaries know full well the amount of cleaning needed to remove the waste left in the cage; those who keep poultry profit by the labor spent in collecting the droppings from under the perches; those who farm know the cost of guano brought hundreds of miles. That all birds pass out materials useless to themselves but capable of being used by plants is too well known to need comment, yet few may have associated song birds with the making of such useful by-products.

All winter long and through the spring a male Redbird or Cardinal choosing to sleep under the shelter of a porch made his roosting place obvious from the white droppings collected on the floor beneath. In the last three months these had amounted to 70 cc. of dry crumbly material which would have been less bulky if pulverized. This mass weighed thirty-one thirty seconds of an ounce. The dejecta from one night, May 13–14, weighed when dry 120 mg. While these are but small amounts it is to be noted

that they represent only the products left in the night and the deposits during the whole twenty-four hours the year through would be very much greater. Even an ounce in 3 months of night collecting would be ¼ lb. a year.

The census of small birds nesting in the North and East parts of the U. S. made by the Department of Agriculture indicates about one pair of birds to the acre in farm land; however, in suburban regions where efforts are made to encourage birds the numbers may rise, especially in Maryland, to twenty-seven or even forty birds per acre.

Assuming the above observations as a conservative basis, one pair of birds might well supply ½ pound of enrichment to the soil per year, while thirty birds should supply 15 pounds per acre.

Yet most of the song birds are migrants and many will be absent and not represented during the winter, so that the above amounts of possible betterment to the soil will be less in any one locality. But, even if the acre receive only ½ lb a year on the farm and 15 on the best suburban haunt of song birds, that will amount to something in a hundred years. Consider the guano beds of Chile, where the sea fowl have been "*laying down treasure and stench for years untold.*" The bats also that forage for insects and do not scatter their wastes but concentrate them largely in their sleeping abodes, show plainly the effects of numbers, for little by little they accumulate tons of guano. Vernon Baily in the September 'Geographic Magazine' gives measurements of droopings in 44 hours from bats in the Carlsbad Caverns and reckons that they would in a thousand years deposit a mass fifty feet in thickness while caves further south inhabited the year through may yield sixty tons of insect remains and excreta of bats every year.

The song bird must help in the return to the soil of plant food; taken away by seeds and depredations made by insects and later transformed by the bird into possible betterment of the soil.

Unfortunately, nothing seems to be known of the value of the droppings of our small birds and we may only surmise that since they evidently contain much uric acid, that, in general, they may be comparable in manurial value to the guano of insect-eating bats or of sea bird origin, or to the manure of Fowls, Geese,

Ducks and Pigeons which have been studied. It is the collections of large masses of these materials in certain places that has led to their utilization; but even the scattered droppings of little birds are not all wasted.

From Bailey's 'Encyclopedia of Agriculture,' we gather that the large birds in domestication rival the big domesticated animals in their usefulness as suppliers of plant food. Theoretically, the little birds should do the same in proportion to their size; and their small size in some cases in counterbalanced by their great numbers.

Physiologically, it is of great moment that some remarkable process in birds makes the water that dissolves the nitrogenous waste stay behind in the body of the bird and not be wasted as liquid urine as it is in common animals; hence the nitrogen waste is very concentrated when it comes to the soil and the wide scattering by small birds gives chance for applications of concentrated fertilizer to chance plants here and there.

If it could be proved that the growth of the trees and weeds along fence rows is sometimes due to chance sowing of seed dropped by birds when perched along the fence, it might also be shown that the various plants along the fence were manured by the bird's droppings, there more than elsewhere, and this might be a contributing element to the success or failure of one plant rather than another.

As a fowl is said to produce 30–45 pounds of excreta a year, it may well be that the Redbird or other song bird will be found on study to produce much more than the above reckoned ¼ pound per year. Evidently there is room for observation and experiment to base conclusions upon.

As the amount of waste in animals is somewhat proportional to the weight of the animal or bird. it would be interesting to compare the song birds with poultry as to weight and thence surmise the excreting value of the small bird; in lack of direct measurements. However, the weight of the song bird is not a feature recorded by the ornithologist, to any extent. To find the weight of a Cardinal bird we must either shoot one or look for information in unusual publications sought out by the kindness of the leaders of the U. S. Biological Survey.

One German author[1] states the following as the weights of our Cardinal; in a list of some 436 birds weighed and compared with the weights of their eggs; the Cardinal, number 423 in the list, had a weight of 40 grams while its egg weighed 4.5 or 11% or one-ninth of the body weight. The number of eggs in a clutch being 3–5 the nest full weighed ¾ or 44% of the body weight.

Other birds weighed: Sparrow 30 g., Crow 1300 g., Woodpecker 20 g., Hummingbird 2 g., Stork 5000 g., Hen 1500 g., and the Starling 77 g. Very many of the smaller song birds weighed each less than 100 g.

Another author[2] for comparison states the weight of the Starling as 92 g. and 75 g. for males from different localities and the female as 83 g.; while he gives for the Sparrow weights of 27½ for the male and 30 g. for the female.

If then a hen, stated to weigh 1500 grams, yields 30–45 pounds of fertilizer a year, a Cardinal weighing 40 grams might yield easily a full pound, so that the above reckoning of a quarter of a pound per annum per bird may well be far too small, even if we doubt that a Cardinal could yield ten times its weight of excreta in a year, as may the domesticated fowl.

And as the Cardinal is but one of many song birds, some larger than it and many smaller, the whole series of birds from the Hummingbird up, will, from their numbers, necessarily yield large amounts of waste products. These wastes being widely scattered and not concentrated in guano deposits escape notice, but theoretically they have still much value to vegetation; how much value remains to be found out by exact observations and experiments in the future.

If in garden practice, 500 pounds of sodium nitrate be applied per acre, this, of course, makes the aid of little birds seem very trifling; however, the like amount of hen manure might serve as well and if one adult fowl yields 30–45 pounds a year, a dozen fowls might fertilize the acre. A few small birds to the acre should be of some value in proportion to their weight, unless they may prove to be very inferior to fowls in proportion to size.

[1] Heinroth, O. Die Beziehungen zwischen Vogelgewicht, Eigewicht, Gelegengewicht und Brutdauer. Ornithologische Monats-berichte 32, 1915, pp. 172–285.

[2] Krohn, H. Vogelgewichte. Ornithologische Monatsberichte, 32, 1915, pp. 137–140 and 147–151.

From the above encyclopedia we gather that 1000 pounds of animal may yield a daily supply of manure having the following realtive weights: Sheep 34.1; Calves 67.8; Pigs 83.6; Cows 74.1; Horse 48.8; Fowls 39.8. Presumably a thousand pounds of Mockingbirds might yield something of the order of weight of the fowl; and this would be concentrated in value owing to the retention of the water by the bird. Thus the values assigned to the various excreta of 1000 pounds of the above animals for a year is: Sheep $26.00; Calves $24.45; Pigs $60.88; Cows $29.25; Horses $27.74; and Fowls $51.10. While the fowl is close second to the pig it may be conceded that this will not apply to all birds. Only future determinations can show where the song birds stand in value from this point of view; but that a thousand pounds of song bird is worth to the land fifty dollars a year is a tentative surmise.

That different birds have different values is obvious from the following analyses, showing the nitrogen etc. in manures of domestic birds. In the Hen: nitrogen 1.60, phosphoric acid up to 2.00, potash up to .90; in the Duck: nitrogen 1.00, phosphoric acid 1.40, potash .62; in the Goose: nitrogen 0.55, phosphoric acid 0.54, potash 0.95; in the Pigeon: nitrogen 1.75, phosphoric acid up to 2.00, potash 1.25.

While actual study may show that the excreta of common song birds have but little manurial value, the above strongly suggests that as birds their excreta may be expected to yield much of three great soil fertilizers, nitrogen, potash and phosphoric compounds which man intentionally seeks out to feed to his special plant crops.

Thus the bird may be said either to add to the plant food man uses or to lessen the amount that man must apply, in any case the bird is useful along the same lines as the man who uses chemical fertilizer and is an aid to man in his efforts of this nature.

Moreover, theory demands that waste of animal be larger when the animal does more work and though it may not seem much work for a bird to sing yet the spontaneous effort puts into action muscles which cannot continue to work without more food and without setting free products that finally increase the waste from the body.

In brief, the more song the more enrichment of the soil. The more enrichment of the soil, the more seed and insect and the more birds and so on; and it is into this complex round of activities that man comes in as a link; wishing more song, less weed seed, less "injurious" insect survival and better crops.

In protecting song birds we increase the pleasure of existence; diminish the labors of getting food; and help in a natural betterment of the soil.

Johns Hopkins University,
Baltimore, Md.