

regular. In one fragment not figured, the teeth are more than twice as wide as in (5) which with (2) and (6) may have belonged to a much larger fish. The markings shown in (1) and (2) are repeated in several other fragments and are evidently part of the armature of the head, but just where they are placed is uncertain. They hardly seem to be opercular bones. The fragments here photographed represent the various kinds of bones, and so may be taken as typical.

Some 60 other fragments have also been received from Mr. Sternberg. These represent all the types shown in the plate indicating no important differences. The deep lower jaw, sharp edged below, is well shown, as are also the oblong evenly blunt teeth of the pharyngeals. The surface markings of (1) and (2) are well shown on various other fragments. These seem to mark sculpture on external bones but we fail to locate them. They much resemble head-sculpture of certain marine cat-fishes.

It is very remarkable that with so many fragments of *Kindleia fragosa* there is none belonging to the vertebral column and that there is no trace of any of the fins. The dentition is quite unlike

that of any other fossil fish known to me. I place the new genus temporarily with the *Chichlidae*, because it has the lower pharyngeals united, and it is apparently a fresh water form. Both these characters are found in all the Cichlidae which abound in the streams of tropical America and Africa. But in all the Cichlids known to me the teeth are small and in more than one row and the bones of the head show no coarse granulations.

Of this enormous group, but one genus, *Priscacara* Cope (type *P. serrata* Cope) has been recognized as fossil. It differs from all the others in having teeth on the vomer "which like the jaw teeth are minute and simply conical," the jaws themselves much shorter than in *Kindleia*. On account of the presence of vomerine teeth, *Priscacara* has been lately taken as the type of a distinct family *Priscacaridae*. Six species of *Priscacars* are described from the Eocene (Green River Shales) of the state of Wyoming and a few neighbouring localities (Twin River, Manti.) A seventh species, (*P. liops*, Cope) is type of the genus *Cockerellites* Jordan, which differs from the others in the longer soft dorsal.

HUNGARIAN PARTRIDGE vs. SHARP-TAILED GROUSE

By P. A. TAVERNER



EVER since the successful acclimatization of the Gray or Hungarian partridge on the west the battle has raged among sportsmen and naturalists as to the wisdom of the introduction. In general, the sportsman has lined up with the pros and the naturalist and nature lover with the cons. Both are probably a little prejudiced, one in favor of adding any sporting possibility to his opportunities, the other against disturbing the status quo or doing anything to interfere with native forms that he studies and is familiar with. Probably as far as prejudice goes, the honors are even.

The sportsman usually looks upon the naturalist as an impractical doctrinaire and the naturalist regards the usual type of sportsman as short sighted, superficial, ill-informed on the fundamentals of biological association and ignorant of what has happened outside of his own experience. There may be more than a modicum of truth in both these views. The naturalist may be overly cautious but it is easily demonstrable that the ordinary run of shooters know no more of the game they hunt than is necessary to outwit it at certain limited seasons of the year; in fact, with a few exceptions, they rarely know even the names of

the species they shoot. There are certain brilliant exceptions on both sides of the question but taking it by and large, I think this reflects the general line-up and weight of authority.

One fact is self-evident, had the cautious naturalist of the present been in control in the past we might have escaped some of the devastating pests that now plague this once clean and comparatively pestless country. Practically all of our serious pests and plagues are introduced ones. Potato-bug, Gypsy-Moth, Corn-Borer, Sow and Russian Thistle, Black-head, Tuberculosis, Smallpox, English Sparrow, Starling, Rat, House mouse, Cockroach, and a thousand and one other ills that afflict our civilization are not indigenous to the country but introduced, often fortuitously in company with more desirable acquisitions. Many valuable importations have been veritable Pandora's boxes, releasing from control a multitude of evils and retaining but a single hope. It is the knowledge of these things and the realization of their application to present practice that makes the naturalist fearful of further unconsidered experiments carrying the same results. He has some grounds for his warnings and certainly cannot be dismissed as an ignorant alarmist.

On first sight it seems rather unlikely that the little Hungarian Partridge can do serious physical harm to the big, strong Sharp-tail or Prairie Chicken, yet we know that the race is, in the long run, not always to the swift nor the battle to the strong. Constant dripping of water wears away stone and, if the occurrences cited by Mr. Potter in the preceding paper are the general habit of a small but pugnacious and battle-trained race against a large but peaceably-inclined one that has had no racial experience in physical combat with competitors, the effects may be serious.

As a rule, or at least through summer and autumn, the two species do not seem seriously to compete with each other. The Partridge is then essentially a bird of the open fields while the Chicken is of the brush and cover. In winter, however, conditions are likely to be quite different, and when both species are driven by inclement weather to the shelter of the coulees or to circumscribed feeding grounds, the contact between them may be close and the competition for a definitely limited food supply may be keen. At such times and under such conditions, determined aggressiveness may well turn the scale in favor of the smaller species. When food is less than the demand it is not the way of nature to pro-rate the supply according to the requirements between the weak and strong. In nature the strong get practically all and the weak get nothing. It is not a pretty thought for sentimentalists who rhapsodize over the beauties of nature but little birds in their nests do not agree and nature shows a calculating efficiency that would shame a pre-war Prussian. As economists tell us good money cannot continue in circulation with poor, so two species that closely compete with each other cannot occupy the same range at the same time, not even in numbers proportional to their adaptability to environment. Eventually one will entirely disappear while the other will increase under the obtained monopoly.

Beside direct physical conflict and the monopolization of food supplies at critical times of the year, there is another, and possibly a far graver, danger from introduced species; one that the naturalist is well aware of while the ordinary observer rarely gives it a thought—that of the introduction of communicable disease. Every race has its own special constitutional weaknesses and its own special immunities. These have been built up through age-long association with certain diseases and confer more or less resistance or tolerance towards the diseases the race has experienced and to no others. We know this well in the human race. Ailments that are regarded as childish affections in the white man have proved devastating plagues to natives to whom they are

new. On the other hand, natives are often absolutely immune to such things as Malaria, Yellow-fever and other complaints that are deadly to the white men. The fact that natives can rarely survive close contact to white men without decimation is due not so much to the usually accredited results of self-indulgence and dissipation but to mumps, measles, tuberculosis, pneumonia, smallpox, influenza and other diseases. There is the same variation in racial resistance in lower life as in man. We are continually searching for strains and races of our common stock that will resist certain ills—disease, rusts, blights, fungus, etc.—and we are finding them, too. It is not, in many cases, that these individuals do not contract the ailment in question but they may have it in the most virulently transmittable form without experiencing any ill effects from it themselves. Typhoid Mary seemed perfectly healthy, yet wherever she went she left a trail of typhoid behind her. It is in these carriers that the greatest danger resides as no ordinary physical examination or quarantine reveals them.

That any form of life brought from afar with different racial history would have the same constitutional reaction to numerous diseases as has the local stock is almost too slight a chance to be considered. When the immunities and weaknesses weigh the scale against the new-comer, the introduction is unsuccessful, the species does not become acclimatized. This explains many of the failures we have experienced in such endeavors. If and when the balance is the other way about success may be achieved but it may be at the expense of native forms who have physiological factors brought against them that they have had no racial experience in combatting.

We cannot at this date definitely say that this has occurred in the case of the Hungarian Partridge in its relation to the Sharp-tailed Grouse but the wonder is greater if it has not than if it has. Certainly, given enough importations this is bound to occur sooner or later but only has to occur once to do the damage unto not only the third and fourth generations but for many more thereafter.

All our grouse are subject to disease epidemics. They rise in number over a series of years and then suddenly nearly disappear to repeat the cycle. This fluctuation in number is not due to overshooting for it occurs the country over, far in the wilds where shooters rarely go as well as close in about civilization. It is obviously a disease result, whether due to Old World disease introduced through poultry or not we know not but it may well be so, and the subject is being seriously studied. However it follows that all the disap-

pearance of native grouse should not be ascribed to contact with the Hungarian Partridge but it seems significant to the writer that, with considerable personal observation over a wide area of Partridge-occupied country, he has yet failed to see the Sharp-tail in contact with the Partridge recover its old maximum of number after one of these cyclic depressions. This may be merely a coincidence of geography or observation or it may represent the grim facts of the case—time only will tell this. In general, and the country over, this is a low year for grouse. It will be five or six years before we can expect another normal maximum season. If, when that time comes, the Sharp-tails reach their usual high peak numbers irrespective of association with the Partridge it will prove not that our alarms were unfounded but that we have blundered through a danger.

Of course all this discussion is now purely academic. The Hungarian Partridge is with us, probably to stay, and it will spread just as far as ecological conditions are favourable whether we like it or not. If it has introduced disease into native stock that mischief is done and is ineradic-

able now and even the total extermination of the original host would do no good now or at any succeeding date. However, the subject is of great interest and should be closely watched as a guide to policies of the future if for no other reason.

The disturbing thought is, that no experience of this sort in the now is of much help in the future. Warnings of evil become buried in past literature and unknown to succeeding advisors who have most weight in such matters. In spite of all the disastrous results of introductions in the past, the English Sparrow and the two Starlings in this country, the rabbit in Australia, the Minah in Hawaii and the dozens of other cases that could be cited, attempts at acclimatization and introduction go merrily on by local organizations who know not the dangers and pitfalls that the past has demonstrated. It is well that control of such work be considerably strengthened. There are undoubtedly forms of life to be found elsewhere in the world that would be valuable acquisitions to this country but the danger of their introduction is great and should not be entered upon without careful consideration as to whether the probable advantage is worth the risk.

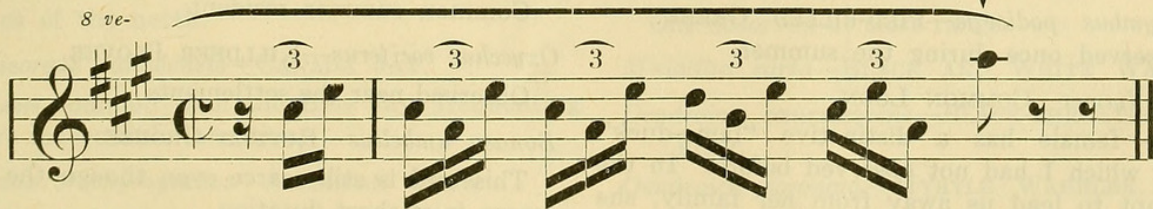
A GROSBEEK SINGING IN A THUNDER-STORM

By ANNA E. MacLOGHLIN

MOST birds stop singing during a very heavy rain, but on July 13th, 1927, at Camp Billie Bear, Muskoka, a Rose-breasted Grosbeak sang exquisitely throughout a severe thunder-storm which lasted three-quarters of an hour.

Being too far in the woods to turn back as the rain came on, I took shelter under a clump of bushes, when my attention was at once directed to the sweet singing of a Grosbeak. Crouched under the foliage there was little protection from the wet, and the rain beat down upon me, making it almost impossible to copy the song which ran:—

Allegro Dolce



After singing a few times, he stopped, and thinking perhaps to make him begin again, I whistled back a feeble response. To my delight he answered me. Pausing again for a few seconds, I answered him back, and he again responded, flying all around me, and finally settling on a tree over my head, as though he were trying to locate me exactly.

He must have answered my whistle at least forty or fifty times, and then, as the storm cleared, he apparently became tired and flew away. Three days afterwards, while passing through the same place in the woods, I heard, apparently, the same bird, whistling the same song. After singing it a few times, he paused, then gave this refrain in a minor key:



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