

of scientific information, the author writes—"What has been the result today of this system (or lack of system)? The most important evil has been the mixing of incompatible species: warm-water predacious fish such as bass, perch, pike, etc., in trout waters; Loch Leven in rainbow or eastern brook trout waters; lake trout in cut-throat waters, etc.; so that today many lakes and streams contain heterogeneous mixtures of both non-native and native forms. These misguided introductions have so upset the balance of nature in many waters as to ruin almost completely the sport-fishing in them."

"Trout Streams" is a contribution to the education of a generation of anglers who will insist on fisheries management that is biologically sound.—C.H.D.C.

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PROTOZOOLOGY. *By Richard Roksbro Kudo, D.Sc.; pp. 689, fig. 291; Charles C. Thomas, Springfield, Ill., 2nd ed., 1939; \$6.50 postpaid.*

This second edition of Kudo is larger by more than two hundred pages than its forerunner, and most of the figures are new. It is a thoroughly modern and solid text-book, with all phases of its subject covered by reference to publications of research workers. The general biology of protozoa is dealt with in the first six chapters, after which (chapters 7-43) representatives of all groups are discussed. Use of the book is facilitated by a splendid index, in which page references to the systematic discussion are printed in bold-face type. As a text-book and work of reference "Protozoology" lives up to everything claimed for it, but, in this reviewer's opinion, loses usefulness as a laboratory manual because of the complete lack of information on microscopy, staining, and culture methods. Perhaps the inclusion of such material would detract from the smoothness of the text, but in order to study protozoa one must have the information available somewhere.—C.H.D.C.

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GOVERNMENT OF NORTHERN RHODESIA. A REPORT ON A FAUNAL SURVEY OF NORTHERN RHODESIA, *with especial reference to Game, Elephant Control, and National Parks*, by C. R. S. Pitman. (Appendix XXIII, on the Native Fishing Industry, by J. Moffat Thompson); 1934; 7/6 from the Government Printer, Lusaka, or from the Crown Agents for the Colonies, 4, Millbank, London, S.W.1. pp. 500 with 11 maps and index bound separately.

This report is one of the most fascinating government documents seen in a long time. The author, one of the leading field-naturalists of Africa, is Game Warden for Uganda, and carried out his survey of Northern Rhodesia under special instructions from the Colonial Secretary. The result is a splendid check-list of all vertebrate species known to inhabit the region, and a wealth of detail concerning those most important in wild life management which will aid greatly in the administration of this resource.

Those who, twenty years ago, freely predicted the early extermination of the larger African animals, overlooked an intangible but decisive factor, namely, the British conscience. The extermination of the African fauna was neither inevitable nor necessary, and over great areas of British Africa it simply was not permitted. Northern Rhodesia has an estimated population of one million wild ungulates. Some species, such as the two species of Lechwe are enormously abundant. Four, the Black Rhinoceros, Hippopotamus, Cookson's Wildebeest, and Yellow-backed Duiker, need special protection. Elephants are by no means scarce in British territory, and their capacity for crop destruction had administrators in a dilemma until Captain Pitman developed his "elephant control" policy in Uganda. If elephants are strictly protected in wild areas and persecuted whenever they damage cultivation they soon learn to behave. Thus the annual destruction of a number of elephants sufficient to cut their increase to reasonable proportions is carried out in such a manner as to give maximum protection to crops.

One interesting idea is that it is imperative for the government to preserve large herds of game to provide food for the natives in areas where tsetse-borne disease does not permit stock-raising. In many places in Africa the encroachment of desert conditions seems to have followed excessive grazing, and Nature's control of stock by "fly" may not have been entirely a curse.

An area is designated as suitable for a National Park, bearing in mind that full use of such a park lies in the future. It is stated, among other qualifications fitting it for a park, that this area has plenty of large carnivores to maintain a natural balance.

*Sample items of interest;*

"The Mushukulumbwe, in the vicinity of the Kafue flats, annually indulge in a great buffalo hunt, when a herd is driven into a selected swamp and dealt with mainly with primitive weapons. It is a man's game and no mistake, and this year (1932) I understand about 30



buffalo were killed and seven of the hunters. A certain quota of fatalities amongst the hunters is regarded as inevitable."

"*Fish Poisoning*—At least nine varieties of fish poison are known and there may be more . . . Very soon the fish are affected and float to the surface stupefied or dead, according to the poison used."—C.H.D.C.

In the Annual Report of the year 1937 of the Director of Gardens, Straits Settlements, Singapore, 1938, appears the following:

#### BOTANICAL MONKEYS

Toward the end of the year there were added to the collecting equipment of the Department two berok-monkeys (*Macacus nemestrina*), which were kept in the garden of the Assistant Curator's Quarters, Cluny Road, and the second Malay plant-collector, Ngadiman, was given charge of them.

The berok is the Coconut or Pig-Tailed Monkey which, as is well-known, is widely used in the East by Malays for gathering coconuts. The wild monkeys are caught as young as possible—so small even that they will sit in the hand; and they are trained gradually to twist young fruits off the coconut-inflorescences so that when they have grown strong enough they can climb the tallest trunks and drop the full-sized nuts from the crown. But it may not be so well-known that a few of these monkeys are taught also such other jobs as plucking mangoes or pulling bunches of rambutans from the orchard trees. It seemed possible, therefore, that a monkey so trained would solve even the botanist's problem of obtaining specimens from tall trees, palms and climbers the height of which rendered them inaccessible; for, if the tree cannot be felled—and to cut down a forest giant for the sake of a few twigs is not merely costly but destructive—then one must employ a native climber or use a shot-gun, and both have their limitations. The berok is imperfect, too, because it cannot scale big trees unless there are climbers on it or small trees beneath by which it can ascend to the main limbs and overcome the long bole, but the experience of the last year has justified the idea that the berok offers the ablest assistance which the student of trees can have in the high forest. A berok upon the shoulder can be likened, in effect, to a falcon on the wrist; and its employment is recommended both to amateurs for its charm and cheapness and to keepers of Reserves where it is desirable to collect specimens repeatedly from the same trees without damage to them.

It must be added that the berok is immune, moreover, to the irritation provoked by *rengas-sap* so that it enables one to collect specimens from these poisonous trees of the Mango-family, so abundant in the forest and yet, through avoidance, so little known.

When Mr. Corner was in Kelantan in April he was fortunate in finding a young berok which had been educated just as a botanist might wish. This monkey, called Merah, was brought to Singapore and after several weeks' training it complied with every expectation. On one occasion in Johore, for instance, it worked in the crown of a Wild Chempedak at the height of 170 feet: on another day it collected specimens from 24 trees, all of which were over 100 feet in height. At Fraser's Hill it obtained good specimens from five of the giant palms, *Caryota equatorialis*, which seem to have been collected only once before in Malaya, many years ago, and of which there were no specimens in the Singapore Herbarium: it revelled, too, in throwing down fruits from so many plants of a big climbing fig that it was discovered for the first time that the gall-figs of this species (*F. calli-carpa* var.) were twice as big as the seed-figs and differently marked. Unfortunately this monkey developed an obscure illness at Fraser's Hill and, though it became a patient at the College of Medicine in Singapore, it had to be put away at the end of September. In its brief career, it had collected specimens from more than 300 different kinds of tree at negligible expense. The technique having thus been proved, the Malay plant collector, Ngadiman, was sent to Kota Bahru to find two more such monkeys and to learn how to train them and how to talk to them. After much difficulty he found the two young beroks, Jambul and Puteh, which were purchased by the Department and installed at the Botanical Gardens.

Now the method of collecting by these monkeys is this. They are kept on a string or, in the forest, they would run away. The string, which is 180 feet long, or more if need be, is wound on a wooden frame like a fishing line and is attached by a swivel to a collar round the monkey's neck. One speaks to the monkey in Malay, though in the present case it is "Kelantanese." "Gi ata" one says, and the monkey goes up the tree. Should it climb along a branch not intended, one shouts "Bukan itu, gi ata lagi"; and when it gets to the right branch "Belah itu" and along it the monkey goes. When it reaches the twigs to be collected, one jerks the string and shouts, "Ambil itu" whereupon the monkey pulls back and bites off





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