

ment, because it dislikes to join readily in a working alliance with other atoms. Viewed from the other side, however, nitrogen is a very active element, for once joined to other atoms in a compound it strives energetically to get out

of the combination. This readiness of nitrogen to free itself is used by man to provide the force which bursts great shells and explodes the war-heads of torpedoes.

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AGRICULTURE

Giant Toad Kills Grubs; Saves Puerto Rican Sugar

PUERTO RICO'S sugar crop mainstay of the island's economic life, has been saved from a menacing insect pest by a giant toad. The pest was the white grub, larva of the beetle known in the United States as the May beetle, or more widely though less correctly as the Junebug. The rescuer was a toad known scientifically as *Bufo marinus*, imported into the island from Barbadoes and Jamaica. The drama of the salvation of an industry by a clumsy but benevolent batrachian is told by Dr. George N. Wolcott, entomologist of the Insular Experiment Station at Rio Piedras.

In Puerto Rican cane fields white grubs swarmed everywhere in the soil, eating off the roots, as they do the roots of the strawberries and other plants in the "States." Search for natural enemies, such as parasitic wasps, was only partially successful, and planters had been reduced to the rather desperate expedient of having the grubs picked out by hand.

Then, through a half-accidental chain of circumstances, two lots of the giant toads were brought to Puerto Rico and liberated in the fields. In a short time their progeny had multiplied into millions. They fattened upon the beetles that were the parents of the white grubs, until beetles and grubs alike changed from a swarming plague into an actual rarity. Now, entomologists who want some of the grubs for scientific purposes have rather a hard time finding enough of them. And the Puerto Rican sugar cane is freed of its most formidable enemy.

Bufo marinus is Latin for "sea toad"—why, nobody knows, for like all toads this lumpy friend of the Puerto Rican planter shuns salt water and breeds only in freshwater ponds. The female is a veritable giant among toads, being fully six inches from her nose to where her

tail would be if she had one—more than double the length of the ordinary American toad. The breeding season lasts the year round, which of course makes for extremely rapid increase when the food supply is good.

The food habits of the great toad were carefully studied by a Puerto Rican woman naturalist, Mrs. Raquel R. Dexter. She found that *Bufo* makes nearly a third of his meals off the cane-destroying May beetles. These are excellently adapted for toad-food, for they are nocturnal like the toads themselves, fly but little, and when on the ground are slow-moving and easy to catch.

Aside from the beetles, *Bufo* feeds to some extent on a few other harmful insect species, though not as much as might be desired, as well as on millipedes or "thousand-leggers," many harmless kinds of insects, and all manner of other creeping things. He has even been known to eat mice; but the accusation that he kills young chicks has been proved to be without foundation.

One bad habit he has: he eats bees. He lurks under the hives where they are set on the ground, and snaps the bees as they come out. This, however, can be avoided by the simple device of setting the hives on raised stands, or by putting toad-tight wire netting around the apiaries.

Bufo bids fair to become almost as famous a traveller as the American mosquito fish, *Fundulus*. Already he has been transplanted experimentally to Hawaii and the Gulf States, and colonization in Florida was held up only by the question whether these monsters might not terrorize squeamish tourists from the North. A lot of the toads was even taken to the island of Mauritius in the Indian Ocean, but the conservative authorities there would not permit them to be introduced, though their cane fields are suffering severely from white grub infestation.

But whatever may be his reception elsewhere, Puerto Ricans are enthusiastic about *Bufo marinus*. A sanguine local entomologist has even suggested the heraldic lamb be removed from the territorial coat-of-arms, to yield place to the Toad that saved the Island.

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It is reported that a trial shipment of 47 tons of New Zealand beef, refrigerated with carbon dioxide, landed in London in excellent condition.

A search in Canada for domestic clay for oil refining has yielded a Canadian clay reported to be more efficient than any imported clay available there.



VERITABLE HIPPOPOTAMUS OF A TOAD!

How the giant toad, *Bufo marinus*, imported into Puerto Rico to save the island's sugarcane crop from swarming white grubs, looms above an ordinary American toad. The picture is a composite of photographs of the two toads on a common background. The big toad has a body length of six inches, twice the length of the smaller animal.