curate title would have been "Sahuaro Susceptible to Crown Gall."

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THE SPECIFICITY OF FROG FLUKES

THERE are few animals more subject to parasitism than are frogs, and the ease with which these animals are collected and kept in captivity makes them ideal for the study of parasites of many kinds. In recent years the life-histories of a few trematodes which infect the frog have been worked out, but unfortunately very little attention has been given to the interesting problem of the specificity of these flukes for their hosts. The experimental approach to this problem is attended with some difficulty, since the mollusk, insect and frog which are involved as hosts must be laboratory-raised, and the investigator has usually been content if he has been fortunate enough to have the necessary hosts to demonstrate the life-history, without trying to find out just how specific the parasite may be for its hosts.

Considerable light can be thrown on this problem if frogs are carefully examined both within their natural range and in regions where they have been successfully introduced. A good example of the latter is to be found in the Hawaiian Islands and in the Sacramento Valley in California. In the former there are no native frogs, but such species as *Rana rugosa* from the Orient and *Rana catesbeiana* from the eastern part of the United States are well established. In a correspondence with Dr. C. H. Edmondson, of the University of Hawaii, I am informed that several hundreds of the American species have been used in his laboratories during the past few years, and not a single fluke has been found in them. Apparently the introduced bullfrog lost its flukes because of the lack of suitable mollusks or insects which serve as hosts. However, trematodes from domestic mammals which were reared on the islands have been found.

The frog "plant" in the vicinity of Gridley, California, was made several years ago, and at present the bullfrog has spread over most of the rice fields in that part of the state. They are very common and are even penetrating the near-by mountain streams, where they are living side by side with two California species, *Rana aurora* and *Rana boylii*. Although the two latter frogs have been found to harbor eight species of trematodes, none has ever been found in the introduced *Rana catesbeiana*. We use this frog in the elementary classes in biology and physiology, and I have personally examined the intestine, bladder and lungs of a large number but without the trace of a trematode. This is of especial interest, because two species of snails of the genus *Gyraulus* and at least seven species of dragonflies belonging to the genus *Sympetrum* are found in California, and species of these genera serve as hosts for certain frog lung flukes in Michigan and for other frog lung flukes in California. Both of the above-mentioned genera are represented in this locality.

Young bullfrogs and a single eastern leopard frog, *Rana pipiens,* were fed the metacercaria of *Ostiolum oxyorchis,* a common lung fluke in *Rana aurora,* but without results.

These observations indicate that there is a rigid specificity for the hosts by frog flukes and that the introduction of frogs into new regions may result in the loss of flukes because of the lack of suitable hosts. If this specificity should prove experimentally to be as rigid as is indicated, it might be used as a means of determining the identity or assisting in the differentiation of species of mollusks concerning which there is at present a difference of opinion. Whether this freedom from these parasites plays any appreciable part in the success of the adventitious bullfrogs over the indigenous frogs can not be stated, because it is doubtful whether the frog flukes actually harm their hosts seriously, but in the Gridley rice fields the bullfrogs outnumber all other native species ten to one. However, many other factors might cause this difference in numbers.

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POST-BOLSON FAULTING IN NEW MEXICO

DURING a recent trip into the San Andreas Mountains, the writers noted two low but interesting scarps in an area of bolson deposits. These were located at 25.2 miles and at 29.1 miles, respectively, west of Tularosa, on New Mexico state highway number 52. Unfortunately, time did not permit tracing these features either way from the highway, but a few facts of some importance were observed.

Both escarpments are moderately straight, and about the same height, approximately fifteen feet. Both face east, and neither one, at least within sight of the highway, shows any indication of an opposite-facing cliff, as would be the case if they were the banks of arroyos.

Even more interesting is the fact that each scarp shows a gentle but unmistakable back slope to the west, that of the easternmost being about fourteen feet per mile and extending for 3.9 miles; that of the westernmost thirty feet per mile for 1.0 mile. Both are considerably west of the center of the Tularosa basin. As a result of the back slopes, the surface of the basin floor actually declines westward from the scarps towards the adjacent mountains, just the reverse of what would be expected, were the intervening

surface occupying the original position produced by aggradation from the ranges to the west.

Still more significant is the fact that the crest of the westernmost of these scarps, that is, the one closest to the mountain range, is at a lower elevation than the one farther east toward the center of the basin, by about fifty feet.

Many observers have described scarps in bolson deposits as wave-cut lake cliffs. And there are, of course, in the arid southwest, many unmistakable old shorelines of former playa lakes now extinct. The fact, however, that these scarps, both of which are on the west side of the basin and face eastward, show long and fairly even backslopes to the west in the direction from which the sediments making the floor in this part of the basin probably came, surely indicates that they are not wave-cut cliffs of now extinct lakes, and points very conclusively to post-bolson faulting, which has produced the cliffs and tilted the floor of the basin.

The fact, also, that, though both scarps face east, the crest of the western one is at a lower elevation than that of the eastern is quite as indicative of fault origin.

It is therefore believed that there has been faulting in the area, not only recent enough to displace the bolson floor, but so fresh as to have permitted but little dissection of the scarps since the faulting. The region is so arid, however, that it is difficult to estimate how long ago that might have been.

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FENSTREAMS

IN Virginia there is a broad overthrust fault by virtue of which the Cambro-Ordovician limestone has been shoved northwestward more than ten miles across younger formations. In Montgomery and Pulaski counties there are four areas several miles back from the northwestern edge of the overthrust limestone from which the limestone has been removed by erosion, producing fensters—windows in the limestone through which the underlying younger rocks are exposed. Streams, meandering on the peneplained limestone, were let down on to the shales and sandstones of the younger formations, retaining the drainage pattern of the limestone streams. Subsequently, these superimposed streams adjusted their courses to the softer strata, but are still crossing enough hard beds to prove their superimposed character. There has been thus produced a type analogous to superimposed streams, but differing from them in that the superposing strata are older instead of younger than those on which the drainage is superimposed. For this type of stream the name fenstream (fenster stream) is proposed.

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SELECTIVE ABSORPTION OF IONS NOT CONFINED TO YOUNG ROOTLETS

IT has been generally understood that the selective absorption of ions by plants is entirely a function of the absorbing tissue of the youngest and most active rootlets and is confined to a more or less restricted zone lying close behind the subapical growing region and usually characterized by the presence of root hairs.

In studies conducted, during 1932, at the Boyce Thompson Southwestern Arboretum, results were obtained which conflict with this traditional view. By cutting off the young, unsuberized portion of Citrus and Vitis roots and carefully sealing the cut ends, selective absorption of phosphate and nitrate was found to take place in the woody parts of the roots. This was demonstrated for small seedling trees and for single roots of large trees growing both in the field and in concrete lysimeters. Briefly, the experimental procedure was to excise the younger part of the root; carefully seal the wound; place this sealed root in a nutrient solution of known concentration, containing both nitrate and phosphate; and to determine by chemical analysis the rate at which these nutrients were removed from the nutrient solution. By using colorimetric methods now available, it was possible to determine minute changes in the nutrient solution, and thus establish the fact that ion absorption was selective.

So far as is known, this experimental procedure has not been employed previously in differentiating between ion absorption in the area of root elongation and the older parts of the root.

These experiments have now been extended to include a number of additional plants and not a single exception to the above observation has been found.

One important phase of this work has dealt with temperature effects. Selective absorption was found to occur not only within the temperature range of root elongation but also at non-killing temperatures above and below this range.

The above observations have been confirmed by numerous repetitions and modifications in experimental technique, with particular attention to the possibility of bacteria or fungi reducing the ion concentration of the nutrient solution, and we are firmly convinced from these data that selective absorption is not a function of young, elongating rootlets only.

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