THE

AMERICAN NATURALIST.

Vol. x. — JANUARY, 1876. — No. 1.

BURS IN THE BORAGE FAMILY.

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A BUR in the light of morphological botany may be seen to be a seed, a fruit or a portion of one, a calyx, an involucre, or what not. Under the teleological aspect, which was once thought to be expelled from natural history, but which has come back in full force, a bur is one adaptation for the dissemination of seeds by cattle or other animals.

One of the most familiar burs is that of the common hound's-tongue (*Cynoglossum*), of the Borage family; and those of one or two species of stickseed (of the nearly related genus *Echinospermum*) are equally troublesome, clinging as they do to the fleece or hairy coat of domestic animals and to clothing. These burs, morphologically, are not seeds, but quarter portions of seed-like fruits. They adhere for transport by means of prickles or projecting points, which are either barbed or hooked at the tip; the grappling organs in some cases occupying the whole surface of the pericarp, in others particular portions of it.

It is rather interesting to notice how in the same family, that is, among plants all constructed on the same particular plan, this same purpose is effected or attempted in different ways, and, as we may say, more or less successfully. The occasion of these remarks came to me with a new plant of this order in which the bur proved to be formed of different materials from the ordinary burs of the family.

It is worth noticing, moreover, that in what botanists must consider one and the same genus, and, so to speak, of one blood, the grappling organs may be either more or less developed, or rudimentary, or even wanting altogether, or when wanting to the seed-like fruits, may be developed on some neighboring part.

The genus *Eritrichium* here offers instructive illustrations. It is very nearly related to the stickseeds. One end of its series of thirty or forty species is very near to *Myosotis*, or forget-me-not; the other, in all its characters other than that of the grappling fruit, comes very near to *Echinospermum*, or stickseed. Now, among species at both ends of the series — in some and not in others — a tendency to bur-like fruit is manifested. The four seed-like nutlets, either smooth or moderately and variously roughened, fall out of the calyx at maturity, and take their chance. But in a few of them, in one especially which is found upon our higher Rocky Mountains, a wing-like circle of prickly teeth is developed around the back, which calls to mind the similar grappling border of a common western stickseed, except that its rays are not barbed. Yet in a recent monograph of the American species it is said that "they bear a few rigid, bristly points; which only need to turn backward to be glochidiate," that is, to become grappling barbs. In another species, *E. Californicum*, the little nutlets usually have a merely wrinkled or roughened surface; but we have lately observed, in what we must regard as a form or state of it (var. *subglochidiatum*), that the crest of the rugosities rises here and there into short, bristly points, and the tips of some of these, under a lens, show minute but distinct backwardly turned barbs. Then, quite at the other end of the genus there is a species, *E. pterocaryum*, which has three of its four nutlets wing-margined, the wing essentially resembling that which, in the commoner stickseed of the same western region, often connects the rayed circle of barbs; and this wing is now and then found to be broken up into narrow lobes or teeth, which only need barbs to convert this outlying *Eritrichium* into an *Echinospermum*. The bearing of such facts upon the question of the origin of the efficient burs of stickseeds and the like is obvious.

But this same genus, *Eritrichium*, in some cases secures dispersion by cattle in another way. It is a common character of the Borage family to have the herbage and the calyx beset with stiff and sharp bristles, in some even pungent or stinging. In one set of species, nearly confined to our western plains and thence to California (the section *Krynitzkya*), the fruit-bearing calyx inclines to close loosely over the four small and smooth or unappendaged seed-like nutlets, at maturity a joint forms underneath, and the whole falls off together. In most of these the bristly hairs that clothe the calyx are particularly strong and sharp; and,

as they spread in all directions, the whole, if caught in the hairy coat of passing animals, is likely to act as a sort of four-seeded bur; the bur here being a fruiting calyx instead of a quarter-section of pericarp. The bristles being straight and smooth, their hold is precarious. We know of no species in which they become hooked. But just that occurs, on a small scale, in nearly half the species of the related genus *Myosotis*, mouse-ear or forget-me-not; that is, the stronger bristles on the calyx are neatly hooked at the tip, and so a sort of bur is formed. It would be more effective if the fruit-bearing calyx disarticulated more readily from its pedicel.

This brings us to the new genus already referred to. It is an insignificant little plant in appearance, recently found by Dr. Edward Palmer upon Guadalupe Island, off Lower California. The specimens were mixed with those of a *Pectocarya* (native to California and Chili), which in aspect they much resemble. But in *Pectocarya* the four-lobed and four-rayed fruit is itself a bur, grappling by a fringe of marginal bristles or slender teeth with hooked tips. But in our new plant, which I have named *Harpagonella*, the nutlets or seeming seeds are perfectly smooth. There is in the flower the ordinary provision for four of them; but two of the lobes on one side seem to be abortive from the first, while the other two grow to an unusual size, compared to that of the blossom. As they enlarge, so does the calyx on that side of the flower, but not on the other. The two conjoined calyx-leaves of that side, united by their contiguous edges almost to the tip, as they increase in size soon begin to fold around one or the other of the growing nutlets, — it seems indifferent which, — leaving the other one "out in the cold," forming a sort of husk which incloses it completely, and then develops from the outside five or six long and narrow finger-like processes, and along the length of these forms a set of hook-tipped bristles, thus producing a most effective bur.

As to the other seed, it apparently starts as fair as its preferred twin-companion, and sometimes it grows to almost the same size and matures its embryo, but more commonly it fails to mature.

This is a curious case of "natural selection," and a sacrificing of three for the greater advantage of one. For an advantage we must presume it to be, or to have been, to be thus protected and provided with means of transport; else, under any view, it would not have come to pass. Moreover, this is a sort of case which is comparatively intelligible under the supposition that it has come to pass in the course of time and the course of nature; while the

supposition of its specific creation in this way at the first, on the plan of destroying two of the four at the birth, and giving one of the remainder a diminished chance for existence, is an utterly bewildering conception.

I know not what quadrupeds or other animals there may be upon Guadalupe Island, of which this bur may have taken advantage for dissemination. I presume there are, or have been, such animals upon the island. But even if there are none, the hypothesis of the development of this bur under natural selection will not thereby be negatived. For although we know of this plant only there, we are not bound to suppose that it originated on this small island. The island is now used as a breeding-place for Angora goats. As they come to be distributed upon the adjacent main-land, we may expect that the little *Harpagonella* will take advantage of the offered means of transport, and compete with its relatives already established there.

THE FLORIDA CHAMELEON.

BY REV. S. LOCKWOOD, PH. D.

WITH the opening of summer, the teaching naturalist is sometimes delighted at finding on his lecture table a curious or attractive specimen from the local fauna or flora. Perhaps the object is the more interesting as being the contribution of some enthusiastic pupil. Sometimes it happens that the object has been, at some cost of trouble, obtained from a distance. In this way, early last June, a pleasant surprise was sprung upon the writer, who found on his table a box containing four small lizards from Florida. Poor little things, there were eight of them when they left the sunny South; for alas, four had perished from the roughness of "the middle passage." They had been unskillfully packed, or rather not packed at all; and the shaking they had experienced had been too much for them. That day another died, leaving but three. To get them home I had a ride of thirty miles by rail. Having put my little box safely in a corner of the car, between the coal-bin and the stove, I took a forward seat, and from the effects of late work the night before soon fell into a doze of a few minutes. I was awaked by the noise of the passengers. Happening to look on the floor of the car, I beheld, to my dismay, the youngest of my lizards under the seat immediately before me. It had got out of the box, and had crept under the