

ence or absence of some of the pterygoid or branchial elements is impossible without macerating. This I have been unable to do, as the cotype which I have examined is apparently the only specimen of the species in this country and is too valuable to destroy.

Of the known osteological characters, the sutural connection of the post-temporal with the cranium is indicative of relationship to the Hemibranchii and Lophobranchii. On the other hand, the fact noted by Prashad and Mukerji that none of the anterior vertebrae are fused indicates that *Indostomus* is not closely related to these groups, but belongs instead with or near the Gasterosteoidea.

The branchiostegals are 5 in number on the cotype, not 6 as recorded in the type description. This number closely approximates that found in the Aulorhynchidae, 4; equals that found in some of the Aulostomidae, 4-5; and is markedly different from the much reduced number found in the Solenostomidae, 1; and also the Syngnathidae, 1-3.

From the available evidence it seems that the Indostomidae can claim no very close relationship to any known family. The only character tending to link it to the Lophobranchii is the nature of the armature. The majority of characters, the body form, fins, teeth, lateral line system, anterior vertebrae and branchiostegals, indicate that its relatives should be sought among the Gasterosteoidea or Hemibranchii. Of the families comprising these two groups, the Aulorhynchidae and Aulostomidae are by far most similar to the Indostomidae. The latter family appears in many respects to occupy an intermediate position and serves as additional evidence of the relationship of the Gasterosteoidea to the Hemibranchii. While this relationship may not be close enough definitely to validate the questionable order Thoracostei, it is much closer than the relationship of the Gasterosteoidea to the Scleroparei which was suggested by Jungersen.

ENTOMOLOGY.—*A redistribution of Monoxia puncticollis and allied species.*¹ DORIS H. BLAKE. (Communicated by AUSTIN H. CLARK.)

LeConte, in his treatment of *Galeruca* in 1865, divided the genus into five groups, the fifth group consisting of two species, *G. maritima* and *G. morosa*, both described by him. In 1885 he added a third species, *G. erosa*. These three species have been synonymized by Horn with *Monoxia puncticollis* (Say). LeConte had never been able to

¹ Received May 22, 1936.

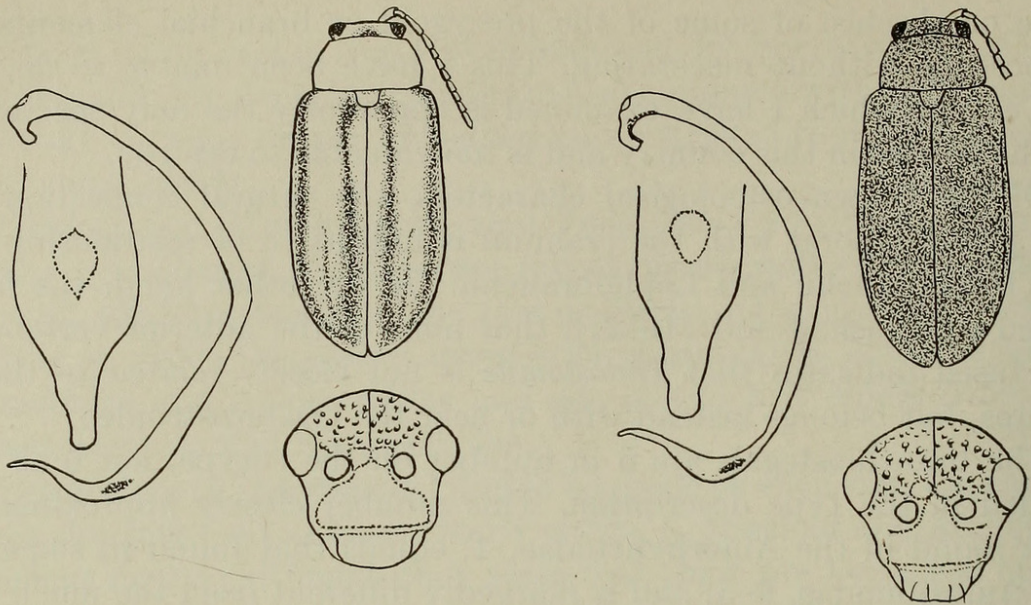
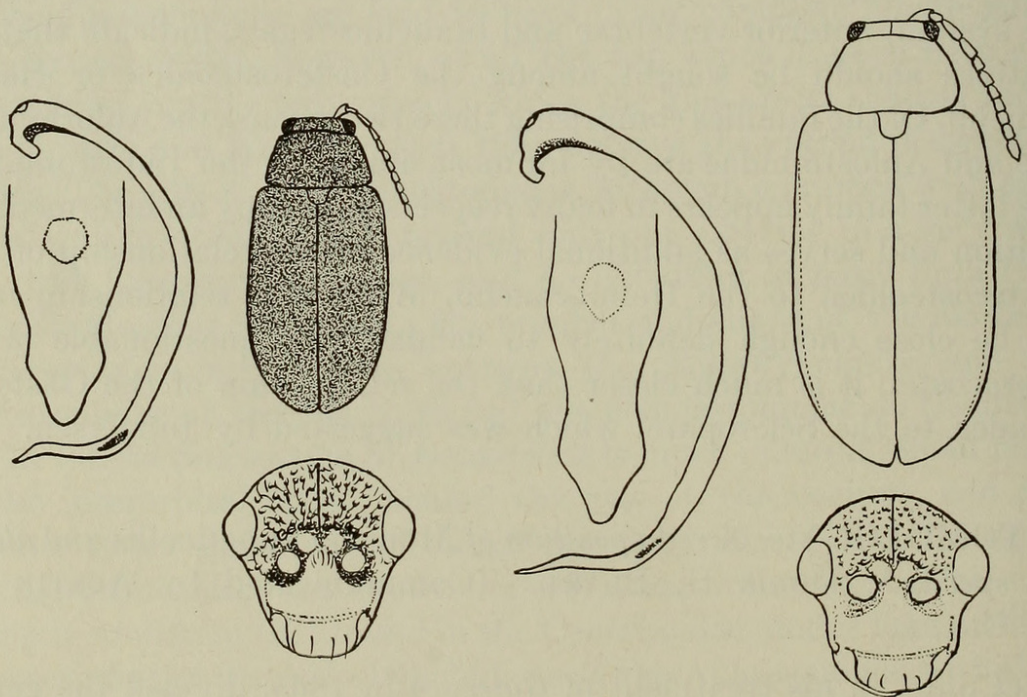
a. *Erynephala glabra* n.sp.b. *Erynephala maritima* (Lec.)c. *Erynephala morosa* (Lec.)d. *Erynephala puncticollis* (Say)

Fig. 1.—a. *Erynephala glabra* Blake, type, Sierra de Durango, Mexico. b. *Erynephala maritima* (Lec.), type in LeConte collection; Gulf States. Genitalia from specimen from Wollaston, Mass. c. *Erynephala morosa* (Lec.), type in LeConte collection; San Francisco, Calif. Genitalia from specimen from Alameda, Calif. d. *Erynephala puncticollis* (Say), type of *G. erosa* Lec. in LeConte collection. Genitalia from specimen from Salt Lake, Utah.—Habit, about 5×; front of head, about 10×; genitalia in dorsal and lateral view, much enlarged.

determine what species Say had before him in describing *G. puncticollis*, and at one time "was disposed to think" it might be related to *Monoxia debilis*. Horn used more than a page in attempting to show that the three species described by LeConte are in reality all forms of Say's species *G. puncticollis*. The fact that these species are all twice as large as Say's measurements of *puncticollis* he dismissed as a slip of the pen on Say's part. Even if this measurement was an error by Say, there is still some objection to placing these very unlike species in LeConte's homogeneous group of *Monoxia*, and still more to reducing to one species three that have very definite and distinctive characters.

These three species agree with the majority of the species of *Monoxia* in one respect,—the claws of the male are toothed and of the female simple. Otherwise the two groups are not closely related, and I agree with Dr. Böving,² who found their larval characters entirely different from those of the smaller species of *Monoxia* and with LeConte, who never did incorporate them in that genus, that they should not be put with *Monoxia*. Although Dr. Böving does not find much difference between the larva of *puncticollis* and that of *Galerucella notata*, the mature beetles do not bear any close resemblance to species of the latter genus. Therefore it has seemed best to set this homogeneous group aside in a separate genus.

Erynephala, new genus

The genus *Erynephala* is separated from *Monoxia* (1) by its longer and differently shaped head, (2) by its differently shaped prothorax, which is widest near the base and is not obliquely truncate at the basal angle, and the disc of which is not channelled in the middle or depressed on the sides as in *Monoxia*; (3) by its pygidium, which is not deflexed, as is usually the case in the male of *Monoxia*; (4) by its much longer and differently shaped aedeagus; (5) by its different larval habits (the larvae of *Monoxia* are leaf miners, and the larvae of *Erynephala* feed in the open); (6) by its different larval characters, as shown by A. G. Böving.

The genus *Erynephala* is separated from *Galerucella* (1) by its shorter antennae; (2) by its differently shaped prothorax; (3) by its claws, which are simple in the female and toothed in the male; (4) by its longer and quite differently shaped aedeagus.

Erynephala includes four closely related species, three of which occur in the United States, and one which is known only from the Sierra de Durango in western Mexico. Although *E. puncticollis* (Say) was the first to be described, *E. maritima* is designated as the type of the genus because of the somewhat doubtful application of Say's name. Of the United States species, *maritima* is known to occur from Halifax, N.S. to Texas, and there is one species labeled Jamaica in the Bowditch collection at Cambridge. The second species, *puncticollis*, is known from Texas (inland) to Manitoba in

² Böving, A. G., Proc. U.S.N.M., 75: 29. 1929.

the Great Plains and Rocky Mountains, and has also been collected in the Federal District near Mexico City, Mexico. The third species, *morosa*, is known only from the California coast. The three United States species are feeders on Chenopodiaceae and inhabit alkaline or saltmarsh regions. In the western United States they are called "alkali bugs."

They are all considerably larger than the species of *Monoxia*, ranging from 6 to 9 mm. All are dull brownish in color, sometimes piceous, and sometimes the elytra are marked by two rather indefinite vittae, one lateral and the other subsutural. The head is densely punctate and more or less pubescent above, with the median line not always well defined. The lower front is not produced, but broad, flat, and glabrous. The antennae are not half as long as the body, with the third joint longer than the fourth, the fourth longer than the fifth, and the remainder approximately the same length, and longer than broad. The prothorax is not twice as wide as long, and the sides are only slightly rounded, not at all angulate, and are narrowed anteriorly. The basal angles are not prominent and are without nodules. The disc is somewhat uneven, with a small depression in the middle and one on either side, not nearly as marked as in *Galerucella* or *Monoxia*, and the surface is more or less coarsely punctate and nearly glabrous. The elytra are elongate, with parallel sides, slightly convex, without depressions, densely punctate, and either glabrous or only moderately covered with short pubescence. The epipleura are visible nearly to the apex. The anterior coxal cavities are open. The tibiae are not sulcate, and the first tarsal joint is as long as the next two. The claw in the male has a fine tooth on the inner side, not as long as the outer, and in the female the claw is untoothed. The aedeagus is very long, slender, and flat, and because of its length lies in a somewhat bent position in the abdomen. It is quite unlike any aedeagus that I have seen in species of *Galerucella* or *Monoxia*.

KEY TO THE SPECIES OF ERYNEPHALA

1. Upper surface nearly glabrous. Mountains of Western Mexico.....
.....*glabra* n. sp.
Upper surface more or less conspicuously pubescent.....2
2. Elytra markedly wider than prothorax and covered with short, fine pubescence somewhat obscuring the punctation; prothorax usually somewhat depressed with deep coarse punctures. Inland species (Federal District, Mexico; Texas; Great Plains; Rocky Mountains to Manitoba)
.....*puncticollis* (Say)
Elytra not much wider than prothorax; pubescence only moderately dense with punctation not at all obscured; prothorax not depressed and more shallowly punctate. Maritime species.....3
3. Pubescence on head and elytra distinct and rather long; frontal tubercles on head well marked. Pacific coast.....*morosa* (Lec.)
Pubescence on head and elytra short, not at all conspicuous; frontal tubercles on head indistinctly marked. Atlantic coast...*maritima* (Lec.)

ERYNEPHALA PUNCTICOLLIS (Say)

Galeruca puncticollis Say, Journ. Acad. Nat. Sci. Phila., 3: 458. 1824.

Galeruca erosa LeConte, Trans. Am. Ent. Soc., 13: 28. 1885.

Monoxia puncticollis Horn, Trans. Am. Ent. Soc., 20: 83. 1893, in part.

As already stated, Horn included under Say's name *puncticollis* LeConte's three species, *G. maritima*, *morosa* and *erosa*. It is by no means certain that Say made a mistake in describing *puncticollis* as three-twentieths of an inch long, or that he did not have in hand a beetle quite different from any of LeConte's species and about half their size. However, since no other species appears to answer his description, I am unwilling to change the name of this well known and economically important beetle. Of the three species described by LeConte, Say's name can be applied only to the inland species, *G. erosa*, since Say wrote that *puncticollis* was taken on the Mississippi and on the Arkansas near the mountains.

LeConte described *G. erosa* as "dull yellow, finely pubescent. Head strongly, densely punctured, prothorax cribrate. Elytra finely, very densely punctured, outer joints of antennae and the tarsi fuscous. Length 8 mm. Utah. Quite different from our other species (*maritima* and *morosa*) by the coarsely sculptured thorax which has also four shallow discoidal impressions. The third joint of the antennae is a little longer than the fourth, whereby it differs from *Trirhabda*, which it greatly resembles in form."

In the LeConte collection are three specimens, all labelled Utah. The one bearing the label *G. erosa* is a female and the other two are males. These correspond with LeConte's description and are without doubt the specimens he had before him in describing the species. The head is pale, with short appressed yellow pubescence, not entirely obscuring the punctation below; the lower front is broad, smooth and shining, and is without the wide depression below the antennal base found in *morosa*. The first four basal joints of the antennae are pale and the rest darker brown. The prothorax is narrowed anteriorly and greatly depressed, with large, coarse punctures, each puncture bearing a short, pale yellow hair. The elytra are wider in proportion to the prothorax than in either *morosa* or *maritima*, and covered with a fine, dense, yellow pubescence, and the punctation is not as coarse as in *morosa*. The body beneath is pale.

This is the most distinctive of the three United States species of *Erynephala*. It is the largest (sometimes as much as 9 mm.), has the densest elytral pubescence, and the most coarsely punctate and depressed prothorax. The aedeagus, resembling that of *morosa* in its tip, differs from both *morosa* and *maritima* in having the opening on the dorsal side situated farther from the tip. As in the other two northern species, there is great variation in color, specimens varying from pale to piceous. Usually the lower front of the head, prothorax and margin of the elytra are pale in the darkest specimens. The elytra in the majority of the specimens examined are yellowish brown, but occasionally they are vittate.

Distribution: Texas (Del Rio, El Paso, Barstow, New Castle, Pecos), Kansas (Meade Co., Clark Co., Wichita), Nebraska (Lincoln), New Mexico (Hagerman, Albuquerque, Artesia, Maxwell), Utah (Provo, Bear River, Thatcher, Garfield, Saltair, Salt Lake), Colorado (Colorado Springs, Rocky Ford, Ft. Collins, Longmont, Greeley), Idaho (Sugar City), Montana (Billings), Manitoba (Winnipeg, Stonewall, Baldwin).

ERYNEPHALA MOROSA (LeConte)

Galeruca morosa LeConte, Rept. Pacific Survey, p. 70, 1857.

Monoxia puncticollis Horn, Trans. Am. Ent. Soc., 20: 83. 1893, in part.

LeConte's Latin description of *G. morosa* may be translated thus: elongate, piceous, lightly covered with cinereous pubescence, the head finely

and densely punctate, with two smooth callosities over the antennal bases, the prothorax strongly punctate, uneven, with a deep median and two more indefinite lateral foveae; the elytra a little wider than the prothorax, convex, densely and not finely punctate, the suture elevated, flat towards the scutellum; length .25 inch. The description is founded on a single specimen collected in a salt marsh at San Francisco. LeConte states that it resembles a black individual of *G. maritima*, but differs from the eastern species by having the prothorax less flattened in front and less rounded at the sides, and the hind angles not flattened, the elytra more coarsely punctured, and the pubescence longer and nearly white.

In the LeConte collection is the specimen from which LeConte drew up his description, bearing the label *G. morosa* and also *San Fr.* and a round gilt label. It is a male and entirely dark except for the reddish brown mouth-parts. The head is without a deep median impression and has two well marked frontal tubercles over the antennal bases. There is also a pronounced depression directly below the antennal base, such as does not occur in either *maritima* or *puncticollis*. The head above is densely, shallowly and coarsely punctate with long white pubescence, longer than in *maritima*. The antennae are entirely dark. The prothorax has nearly straight sides, is slightly convex with a small median depression and two lateral ones, and is shiny and covered with coarse, shallow, sometimes confluent punctures, not so dense in the middle. There is a slight inconspicuous pubescence on the sides. The elytral humeri, as in *maritima*, are not prominent, and the depression within is very slight. The elytra, not much wider than the prothorax, are shiny and have dense, coarse punctation and a white and not very conspicuous but long pubescence, slightly longer and more erect than in *maritima*.

LeConte points out plainly the differences between *morosa* and *maritima*. His statement that the hind angles of the prothorax of *morosa* are less flattened than in *maritima* does not hold in all cases, but generally the prothorax of *morosa* is not so depressed as that of *puncticollis*. *Morosa* differs from both *maritima* and *puncticollis* by the deep depression below the antennal bases on the lower front, as well as by the differently shaped aedeagus. It differs from *puncticollis* by its smaller size, less deeply punctate and depressed prothorax, less pronounced humeri, with the elytra not as wide in proportion to the prothorax as in *puncticollis* and longer white pubescence, in contrast with the short, yellowish pubescence of *puncticollis*. Like both *maritima* and *puncticollis*, *morosa* has several color forms. It may be pale, or the elytra may be vittate.

A. T. McClay writes that he has always collected this species in the salt marshes along the California coast.

Distribution: California (Lake Merritt, Alameda Co.; Millbrae, Los Angeles Co., Oakland, San Diego, Seal Beach).

ERYNEPHALA MARITIMA (LeConte)

Galeruca maritima LeConte, Proc. Ac. Nat. Sci. Phila., 17: 218. 1865.

Monoxia puncticollis Horn, Trans. Am. Ent. Soc., 20: 83. 1893, in part.

LeConte's Latin description of *G. maritima* may be translated thus: elongate, testaceous, fuscous or black; head coarsely punctate, prothorax short, narrowed anteriorly, with broadly rounded sides and not at all prominent angles, at base on either side obliquely subtruncate; the disc somewhat convex, strongly punctate, shortly canaliculate, and on either side vaguely foveate; the posterior angles flattened and obtuse; the elytra densely

and rather finely punctate and covered with short, not dense, pale pubescence. Length .30 inch. There are color varieties in which the prothorax is partly testaceous and the elytra black with the margin and suture pale. No type locality is given, but LeConte states that the species is abundant on the seacoast from New York to Florida.

In the LeConte collection the specimen bearing the label *G. maritima* has also a round bright red label indicating the locality as the Gulf states. It is a mutilated male specimen without eyes, with only a portion of one antenna, and lacking two legs and part of a third. Except for the yellowish brown labrum it is entirely dark. The head is not at all conspicuously pubescent, in contrast with the long white pubescence of *morosa*, and is coarsely and confluent but shallowly punctate, not as densely punctate as in *morosa* and *puncticollis*. The antenna, of which only the first six joints remain, is dark. The prothorax is not depressed except for a faint median anterior spot and two faint lateral impressions and flattened hind angles, and has only slightly arcuate sides. It is shining and with scattered coarse and rugose punctation, but is not as densely punctate as in *morosa* nor excavated with deep coarse punctures as in *puncticollis*, and is nearly smooth in the middle. There is little trace of pubescence. The elytral humeri are not prominent, as they are in *puncticollis*, and there is only a slight trace of intrahumeral depression. The punctation is dense, coarse and distinct, but not as coarse as in *morosa*, and there is rather sparse short pubescence, in contrast to the long pubescence of *morosa* and the thick, fine pubescence of *puncticollis*. Besides this specimen, there are eight others, four males and four females, labeled "Del." All are somewhat paler, some yellow brown without vittae, others with entirely dark elytra and particolored prothorax, others vittate.

This species is distinguished from *morosa* by the less conspicuous and shorter pubescence, the more finely punctate elytra, the distinctly flattened hind angles of the prothorax (see notes on *morosa*), and the quite differently shaped tip of the aedeagus. It is distinguished from *puncticollis* by its generally smaller size, less coarsely and deeply punctate and less depressed prothorax, less prominent elytral humeri, more sparsely pubescent elytra, and the differently shaped tip of the aedeagus.

Some specimens from Florida and Texas, possibly representing *M. puncticollis* var. *texana* Schaeffer³ are usually pale with brown elytral vittae, and show a more pronounced swelling near the tip of the aedeagus than is found in the northern specimens. Often in the northern specimens there is a one-sided swelling near the tip, so that this variation in the southern specimens seems to be only a matter of degree. The beetles do not present any other structural differences.

E. maritima is not known to be injurious to beets. It is found only in the salt marshes on the eastern coast feeding on *Salicornia*, *Dondia*, and *Salsola*, although in breeding cages I have reared it with no difficulty from egg to adult on beet leaves.

Distribution: Nova Scotia (Halifax), Maine, New Hampshire (Rye Beach), Massachusetts (Ipswich, Marblehead, Wollaston, North Cohasset, Cambridge), Connecticut (Milford, Lyme), New York (Long Island, New York City, Coney Island), New Jersey (Boonton, Avalon, Longport), Maryland (Ocean City), Virginia (Ft. Monroe, Virginia Beach, Wacha-

³ Schaeffer, Can. Ent., 64 (10): 237. 1932. According to Schaeffer this variety is more closely related to *maritima* than to *morosa* or to "typical *puncticollis*." It would appear that he regards LeConte's species *morosa* and *maritima*, which he calls "forms," equal in rank with his variety *texana*.

preague), South Carolina (Charleston), Georgia, Florida (Sand Point), Louisiana (Cameron), Texas (Corpus Christi, Brownsville, Galveston), Jamaica (Kingston, Liguana Plain). Two specimens labeled *Kansas* are probably mislabeled.

***Erynephala glabra*, n. sp.**

In size, shape and coloring similar to *E. maritima*, but nearly glabrous on upper surface. Head reddish brown deepening to darker brown on occiput, coarsely and confluent punctate on upper half with a slight trace of fine pubescence. Tubercles not pronounced and depression below antennal base not marked. Antennae reddish brown and like the other species. Prothorax not twice as wide as long, narrowed anteriorly and with slightly arcuate sides; disc with trace of central and two lateral depressions, hind angles not as distinctly flattened as in *erosa* or *maritima*; punctation coarse and scattered, slightly more distinct than in *maritima*; only a slight trace of pubescence visible under high magnification; color deep reddish brown. Scutellum pubescent. Elytra with humeri no more developed than in *maritima* and *morosa*, densely and coarsely punctate, nearly glabrous excepting a slight trace of pubescence near lateral margin which disappears at apical angle; reddish brown with two darker vittae, one near suture, the other lateral, these broadening and coalescing at apex. Body beneath dark brown deepening to piceous on metasternum and first abdominal segments, lightly pubescent. Length 6.5 mm; width 3 mm.

Type: male in Bowditch collection, Museum of Comparative Zoology, Cambridge, Mass.

Type locality: Sierra de Durango, Mexico.

Remarks: This species from the mountains of western Mexico is very similar to the eastern maritime species. The only external differences between the two are the slightly deeper punctation and the nearly glabrous upper surface of the Mexican species. All the other species of the genus have distinctly pubescent elytra. The aedeagus, too, is different, having a tip similar to the eastern species, but being much wider behind the tip.

ENTOMOLOGY.—Some new leafhoppers related to *Thamnotettix*.¹

E. D. BALL, University of Arizona, Tucson, Arizona.

The writer is working on the tree and shrub inhabiting division of the old genus *Thamnotettix* and has recently divided the group into a number of genera. As there are requests for determinations in some of these divisions the following species are described.

***Gloridonus spatulatus* Ball n. sp.**

Resembling *gloriosus*, smaller, golden with less green on the clavus. The female segment with a narrower and shorter notch. Length ♀ 5.5. mm.

Vertex shorter and more obtusely angled than in *gloriosus*, scarcely half longer on middle than against eye, female segment long, rounding posteriorly with a slightly wedge shaped notch reaching one third of the way to the black marked base. Male plates longer and roundly narrowing, almost oval instead of very broad and almost truncate as in *gloriosus*. The finger like tips curved up around the tips of the smaller and shorter styles.

¹ Received July 11, 1936.



1936. "A redistribution of *Monoxia puncticollis* and allied species." *Journal of the Washington Academy of Sciences* 26, 423–430.

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