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NOTES ON A COLLECTION OF HERPETOZOA FROM THE YUCATAN PENINSULA OF MEXICO

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The University of Colorado Museum and the Thorne Ecological Research Station sponsored an expedition to the Yucatán Peninsula for the purpose of collecting certain endemic races of the teiid lizard genus, *Cnemidophorus*. Incidental to collecting these lizards a number of other species were collected. These are reported on in this paper. A few snakes were also acquired, but these and the amphibian larvae which were collected will be reported on in separate papers.

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The expedition left Boulder, Colorado, June 19, 1959, and returned on July 12. Collecting times and sites on the Peninsula consisted of two short trips to 9 km. north of Merida, Yucatán, on the 25th and 26th of June; five days on Isla de Cozumel, Quintana Roo, and four days in the vicinity of Pisté and Chichén Itzá, Yucatán. On Cozumel we encountered rain and could collect profitably for two days only. The party consisted of Mr. and Mrs. Herbert Beargie, Mr. Christopher Smith, a National Science Foundation undergraduate participating scholar, and myself. A total of 439 specimens representing 25 species were collected on the Peninsula. These specimens, with the exception of a representative series which has been sent to the Mexican National Museum, are housed in the University of Colorado Museum.

Leptodactylus labialis (Cope)

Seven males, three females, and seven juveniles were collected in the vicinity of Pisté, Yucatán, on the evening of July 4. It had rained fairly heavily the evening before and was overcast on the night of the 4th, with a very light drizzle. We heard a weak, high-pitched, upwardly inflected peep or bleat, nearly whistle-like, lasting about $\frac{1}{2}$ second and given at long and irregular intervals. Finally a male *labialis* was located crouching between two small stones near the edge of a manure-polluted mud wallow in the center of a road. There was no free water at the time, but probably there had been some the night before. There were numerous small rocks around the wallow and in the mud of the wallow itself. Three froth nests were found, each lying beneath a rock near the periphery of the wallow. The nests consisted of pockets in the mud about $2\frac{1}{2}$ inches in diameter completely filled with a gleaming white froth of the appearance of half-beaten egg white but more viscous. Each nest had an exit point consisting of a small crevasse below the lip of the rock above. Eggs of varying stages of development were found in all these nests. The freshly laid eggs are a bright yellow and are scattered haphazardly through the froth but tend to occur in small aggregations.

A second breeding site was located later in the evening. Here the bulk of the specimens were collected. The site consisted of a series of small water-filled basins in an exposed mass of limestone. The area is partly overgrown with small trees, and one of the basins was partly filled with wet mud. Here also small rocks lay in and on the mud, and, under these, froth nests were found. A group of some ten frogs were collected here, most of them males. The head of one frog was seen through a small $\frac{1}{4}$ -inch hole beneath a rock well above the water level but still in wet mud. When the rock was lifted slowly it was obvious that the frog was constructing a brooding chamber. Judging from the position of the frog and the marks in the walls of the cham-

ber, this construction was achieved by pushing against the mud and slowly expanding the chamber by internal pressure. No traces of excavated waste could be detected. The chamber was nearly $2\frac{1}{2}$ inches in diameter and hence must have been near completion. The specimen was collected but was inadvertently placed in a bag with other specimens so that its sex was not determined. I am under the impression, however, that it was a female. Within an area of three square feet, four other completed, froth-filled nests were found, and in this same small area were located the bulk of the specimens collected. These were all on the ground, in the open, or crouched between stones. The males sang in the same fashion as those heard previously, the calls being uttered at sporadic and irregular intervals. Two juvenile specimens were found here, and others were located on wet bare mud in the area.

There is considerable variation in the color patterns of these frogs. The general effect is of a mottled dark- and light-brown pattern interspersed with gray. The mottling is made up of dark-brown irregular blotches of varying size, the larger of which tend to be specifically located. One blotch, roughly triangular, is located on the eyelids and between the eyes, its apex extending posteriorly. This blotch is followed by a smaller median blotch which in turn is followed by a brilliant orange-red spot between the scapulae. The orange spot is followed by a large median brown blotch located at midbody. On either side of the orange spot is found an elongated dark blotch. Other marks are less regularly arranged. The dark blotches often have darker edges and are surrounded by light-gray borders. In alcohol, the orange marks have turned a crimson magenta, and the same color in some specimens occurs extensively between the dark blotches over most of the dorsum including the head. This red pigmentation was more conspicuous after fixation and preservation in ethyl alcohol than it was in the live specimens.

The adult males measure, from snout to vent, 36.9, 39.8, 36.7, 36.3, 36.1, 36.8, and 39.9 mm; females, 39.0, 38.7, and 39.3; juveniles, 13.6, 13.0, 14.0, 12.9, 13.0, 13.0, and 14.3. All three females are gravid with eggs of all sizes.

One subadult male measuring 20.3 mm from snout to vent was collected at "The Lagoon", 9 km. south of San Miguel, Cozumel Island. This specimen was found about 3:00 p.m. foraging in damp grass some 30 feet from the lagoon, and constitutes a record for the island.

Triprion petasatus (Cope)

Nine specimens of this hyliid were collected on the nights of the 3rd and 6th of July just northeast of Pisté, Yucatán. Promising water-filled limestone basins had been found in the afternoon of the 3rd preceding a heavy rain, and after dark these were visited. *Smilisca* were found here and collected; but

in the distance, a different call was heard, consisting of a clear, resonant, upwardly inflected hornlike bleat. An individual call was approximately $\frac{1}{2}$ second in duration with a pause of approximately $1\frac{1}{2}$ seconds between calls. We traced these calls to a small but deep limestone basin fairly high up on a limestone dome heavily overgrown with trees and cactus. The basin itself was nearly overgrown with bushes and a large many-branched columnar cactus. In the flutings of this cactus, $2\frac{1}{2}$ to 5 feet above the ground, a chorus of *petasatus* was found. Under the circumstances, without tongs, collecting was difficult, but we managed to collect a few before disrupting the chorus completely. Flashlights did not overly disturb them, but after the hylids had been displaced by our collecting efforts they did not resume singing. Tadpoles were collected from the basin below. These seem about half-grown. Smaller choruses in similar locations in the area yielded a few more specimens.

The single vocal sack with two large lateral buccal openings is extremely thick-skinned and unpigmented. All of the specimens, during fixation, developed a strong flexure in the neck so that the heads are bent down, making total length measurements difficult. Allowing for the inevitable inaccuracies resulting from this flexure, the specimens measure 46.6, 52.4, 44.3, 42.9, 50.3, 52.9, 49.8, and 54.6 mm from snout to vent. These specimens are very much smaller than the type which measures, according to Kellogg (1932: 139), 72.5 mm. The color pattern in life is much as Barbour and Cole (1906: 154) describe it, except for the arms and legs, on which the dorsal blotches tend to form transverse bars.

Smilisca baudini baudini (Duméril and Bibron)

Thirty-two males and four females were collected on the nights of July 2, 3, and 6, in the vicinity of Pisté and from an area 3 km. east of Chichén Itzá. An additional immature female, collected on June 3, 1955, from Chichén Itzá, was donated to us by E. C. Welling.

Four males were collected at about 8:30 p.m. in the vicinity of a large filled-in cenote 3 km. east and about $\frac{3}{4}$ km. north of Chichén Itzá. Small choruses could be heard all through the area scattered at considerable distances from each other. We forced our way through the thorn forest to one of these and found a small water-filled basin about 2 feet wide and 6 inches deep in a limestone outcrop. The vegetation was more sparse here and overhung the basin. The song consisted of two rapidly emitted horn-like bleats of alternating pitch. The calls are not shrill, but resonant, though giving the impression of being slightly muffled. Each bleat lasts a little less than $\frac{1}{5}$ second with a shorter time interval between. A motif of a higher-pitched "Ah" followed by "Ah" of about a half-tone lower is rapidly repeated about

four or five times. After approximately 6 seconds another stanza repeating the motif the same number of times is sung again. This is repeated for from a few minutes to as much as 15 or 20 minutes, after which a long rest occurs of varying duration. We discovered that in these small aggregations two frogs constitute a chorus. If the first voice of a singing pair is disturbed, the chorus ceases; but if the second voice is disturbed, the first will continue to try to initiate a song by bleating in the same pitch at the correct intervals for his share of a stanza, leaving pauses of appropriate length for his colleague. An incomplete stanza of this sort is followed by a pause of much greater duration than the 6 seconds normally occurring between stanzas. This effort to initiate a song is repeated at odd intervals for a minute or two. At a later time and in a different locality, we collected the second voice of a chorus first and it later took us about 15 minutes to locate the first member. In this case as much as 5 minutes would elapse before the frog attempted to initiate a song again. Active but more distant choruses seemed to stimulate attempts to initiate another song of stanzas.

On two occasions a male, after trying to initiate a song by calling his share of a stanza at appropriate intervals, uttered a lower-pitched coarse roar of possibly $\frac{1}{2}$ second duration. I interpret this roar as a more demanding call for a response in a duct; but further observation would be necessary to establish this for a fact.

It rained in the early part of the evening of July 3. That night numerous choruses could be heard in the area around Pisté. We searched out a number of these and found the habitats essentially similar in all instances. Occasionally clusters of water-filled limestone basins would be found. Here the hylids were more abundant, and it was more difficult to recognize that a song was a duet consisting of a series of motifs in canonic style. Usually the hylids were perched 2 to 5 feet above the ground in twigs or in the crotches of small branches above or near the water, but occasionally in larger breeding areas they would be found in the open on the bare limestone. One pair was found in amplexus, but breeding must have started much earlier because almost every basin contained tadpoles in large numbers and of varying sizes. At one place both *Leptodactylus labialis* and *Tripurion petasatus* were found together with *Smilisca*.

The color pattern of the dorsum is extremely variable, but a basic design is evident. The ground color is a light brown, anteriorly changing to an olive-greenish color, upon which is superimposed a bold pattern of dark olive-brown markings. From a large, dark, triangular area in the occipital region two arms extend up onto the eyelids, and one broad, posteriorly extending arm fuses with two large, irregular, diagonal marks which diverge posteriorly. The

sides are speckled with smaller spots of a light to deep dark brown. Both the arms and legs are crossbarred dorsally. A brown band extends from the lips up and over the nares, through the eye, across the tympanum, and posteriorly above the arm, where it is abruptly truncated. The posterior part of this band is a deep, mottled brown. A short brown bar extends from the eye to the lip. Both upper and lower lips are narrowly margined with light brown. The pair of vocal sacs are pigmented, but the strip of non-distensible skin between them is not.

Hyla staufferi (Cope)

Two males and three females were collected at the Casa San Juan, 4 km. north of San Miguel on Cozumel Island. They were collected after dark from 1 to 6 feet above the ground off the trunks of coconut palm trees and stumps adjacent to an elevated rain water cistern. In the males the vocal sac is apparent but not pigmented nor highly vascularized. It is single and opens into the buccal cavity by two large, elongated slits. None was heard singing during the five days we stayed at the Casa, but the females are gravid with fully mature pigmented eggs. From these facts I assume the breeding season of these forms was close at hand. The rainy season was just getting underway. No ponds or puddles occur in the vicinity of this sandy spot, but limestone basins were found farther inland in the thorn forest.

In life the specimens were vaguely mottled, with a dirty gray-green above and white below. In alcohol a pattern of stripes is more conspicuous. A mottled, melanistic, subtriangular blotch extends across the interorbital area, two mottled stripes arch from behind the eyes over the scapular region to about a third of the way down the body. A similar stripe starts at the eye, passes above the tympanum, widens, and extends halfway down the body. Posteriorly, the dorsum is sparingly marked with mottled blotches of darker pigment. An elongated, blue-black spot occurs on either side of the pubo-ischial prominence. The arms and legs are vaguely crossbarred dorsally.

The males measure 25.8 and 25.7 mm from snout to vent and the females 26.1, 26.0, and 25.2.

Rana pipiens (Schreber)

Four specimens were collected in a large cenote 3 km. east of Chichén Itzá. Two of these, a male and a female, are marked with a few large, dark blotches between the dorso-lateral folds and possess a bold, banded pattern on the hind legs. The other two, also a male and female, are completely devoid of a dorsal pattern and bars on the legs. The largest of these, an unmarked female, measures 100.0 mm from snout to vent.

Thecadactylus rapicaudus (Houttuyn)

Three specimens, two males and one female, were given us by E. C. Welling. All three, according to Mr. Welling, were collected in Chichén Itzá on or in the thatch of dwellings in the area. They are apparently much feared. This is not surprising considering their size and their ferocious appearance accentuated by the large eyes, mouth, swollen temporal region, and sturdy legs.

The female resembles the males in color patterns and form except for the tail, which is smaller. The swollen area just posterior to the vent which is so conspicuous in the males is also smaller. In the males there is a spur consisting of two or three enlarged and protuberant scales directed upwards on either side of this post-anal swollen area. The same structure occurs in the female, but it is smaller and made up of smaller and more numerous scales.

In all three specimens the color pattern is a complicated system of irregular transverse bars, spots, and longitudinal lines of dark brown on a beige background. A dark line begins on the rostrum, passes back through the eye, continues posteriorly through the ear and on. It is interrupted by the arm but continues indistinctly down to the inguen. A series of paired dark blotches begins in the parietal region and extends back to the base of the swollen portion of the tail. The tail itself is streaked with longitudinal fine lines, but cross bands of brown on beige are also evident. The ventrum is beige and minutely speckled with dark brown.

The vertical pupil is like that of *Peropus mutilatus*. If the two edges should meet, four small, rhomboidic orifices would remain open. The large eyes are deeply set back from the lips and are invisible from the ventral surface in spite of their large size. The eye is one half as long as its distance to the snout. Four or five supraorbital scales above the postero-dorsal corner of the eye are tentacled.

The fingers and toes are heavily webbed so that only the distal half of each digit is free. The terminal claw and phalanx of each of the outer digits is completely retracted between the lamellae into scale-covered sheaths opening ventrally between the two rows of lamellae and raised on the back of the finger into a high ridge. The claw is absent from the first digit of the manus and vestigial on the first of the pes.

Aristelliger georgeensis (Bocourt)

Seven specimens were collected on Cozumel Island, one adult in San Miguel, two juveniles and four adults at the Casa San Juan, 4 km. north of San Miguel. The juveniles were found about 5:00 p.m., June 26, beneath the trash and leaves at the bases of coconut palms. Later, about 9:00 p.m., a large male was collected by hand off the trunk of a coconut palm in the garden

of the Maya Luum Hotel. A larger specimen escaped by climbing high up towards the crown. Later in the evening one more specimen was collected by searching the boles of palms by flashlight, and two more were seen but escaped. This represented approximately an hour's collecting on some 40-odd palm trees. They were easily spotted by flashlight about 8 feet above the ground. Light, however, disturbed them and caused them to climb higher in the trees. The following nights two were successfully swept to the ground with snake sticks, but one escaped. A third specimen was caught by hand on the screening of our house. These larger specimens were pugnacious and would bite. Another adult specimen was found beneath a pile of driftwood and trash in a sheltered spot on the beach.

There has been little change in color pattern subsequent to preservation. In alcohol they are dorsally gray and ventrally white. Diffuse white spots occur on the sutures of the labials, and single white granules occur scattered over the head and neck. The axillary region is darker than the dorsum and is marked by white, vertically orientated spots and streaks. A much larger similar area, but paler, occurs in the inguen and on the flanks. Dorsally the tail is blotched with dark brown. Clusters of these blotches suggest cross-banding anteriorly. In most of the specimens a few dark flecks or spots occur on the back as well.

Anolis limifrons rodriguezi (Bocourt)

Fifteen specimens of this lizard were collected, eight from Isla de Cozumel near San Miguel and seven from Pisté, Yucatán. The specimens show considerable variation and poorly fit what published descriptions are available. The keeled dorsal scales, distinctly smaller than the ventrals, the nearly smooth chest scales, vaguely keeled nearer the humerus, the smooth midventral scales, the unicarinate median head scales, moderately long lower leg, round tail, and enlarged post-anal scales in males all indicate that the specimens of this small series are *A. l. rodriguezi*. Several females had a bright middorsal yellow-green median band running from the occipital region to the proximal base of the tail. This has faded in alcohol and now consists of a white stripe about four scales wide bordered laterally by tan stripes about three to four scales wide. The tan stripes are in turn bordered laterally by a narrow, one-scale-wide stripe and then a black stripe four to five scales wide. This peculiar banded pattern flares slightly on the neck and over the pelvic region. Smith and Kersten (1955) and Pianka and Smith (1959) report a similar phenomenon in *Anolis crassulus*, and Stuart (1955) has observed it in the Guatemalan *A. l. rodriguezi*. The single female collected on Cozumel vaguely shows the same pattern. The specimens from Isla Cozumel do not differ conspicuously

from the mainland specimens, but a fairly distinct double row of slightly enlarged scales does run down the middle of the back. This is replaced by a median row of much larger scales on the tail. In three males a fleshy raised nuchal crest is apparent.

All the specimens collected by the party were found in twiggy brush close to the ground. Specimens were seen on a vine-covered wall and on rocks beneath bushes. Only one specimen was seen in a small tree approximately six feet above the ground. They were extremely abundant in brush piles along a strip being cleared for a road south of San Miguel. These we were unable to snare or catch by hand. Overcast and rainy weather did not seem to hamper their activity appreciably.

Laemantus serratus (Cope)

Three specimens, measuring 53, 64, and 46 mm respectively, were collected. Two specimens were found in open woodland in the vicinity of Chichén Itzá by E. C. Welling on October 16, 1954, and February 17, 1956. The other specimen was collected just east of Piste among brush and weeds by the side of a forest road. This specimen still shows an umbilical scar. A number of juvenile *Ctenosaurus* were collected in the same area and were initially mistaken for *Laemantus*. Superficially they are much alike.

The dorsal surface of the head of the juvenile is a gray-green. The anterior edges of the prenasal, the scale immediately medial to it (outer internasal), the single canthal, the anteriormost superciliary, and the frontal are black. A slightly raised ridge occurs on the supraorbital semicircles; this is dusky in color. The temporo-occipital ridge is encircled by a row of keeled scales conspicuously different from the scales on either side, but these scales are not produced into projecting serrated scales as they are in adults. A gray-green band, five scales wide, starting at a point on the nape, extends to the base of the tail, where it expands to contribute in the formation of the ground color of the entire tail. This is crossed by chevron-like dark-brown marks about five scales long. Laterally these marks are continuous, with faint extensions giving an impression of cross-banding.

Beginning at a dark-brown spot on the middle superciliary scale, a light-brown band extends diagonally down over the eyelids, crosses the tympanum, passes to the shoulder, where it expands considerably, and then continues down the flank, where it is four or five scales wide. It again expands above the hind leg, continues onto the tail, and here merges with the dorsal stripe. The edges of this band tend to be darker than its center. Above the tympanum and above the dark band on the neck are white spots. A white band begins below the eye and extends to the shoulder. This band resumes at the axilla and

extends to the inguen. Here on the flank the upper edge is undulant and is bordered by a dusky edge. The last dorsal undulation in the inguinal region is the largest and is in contact with the dark lateral band. This area could easily be isolated as a spot. Posterior to the hind leg a spot-like remnant of this band appears again. The long delicate tail is banded with grey-green and brown. The entire ventrum (exclusive of the tail) is green, as is the ground color between the longitudinal dark and light stripes.

The remaining two specimens were not seen alive. The green areas in them now appear to be a light reddish-brown. The remaining elements of the pattern, however, are essentially the same.

The scales of the occipital ridge in the smallest specimen are partially produced, while those of the largest form a conspicuous serrated crown. The circumorbital scale counts are 54, 56, and 59 respectively.

Basiliscus vittatus (Wiegmann)

Ten specimens of this magnificent lizard were collected on the Isla de Cozumel, five males and five females. One of the latter is a juvenile measuring 46 mm from snout to vent. The species is quite common along the coast of the island. We saw many more individuals than were actually collected. A male and female were found foraging around a temporary pond located in an open glade some 30 yards from the sea. They both ran bipedally about 30 feet towards a thicket of dense brush, but halted and froze before reaching it. Unlike other large lizards they are remarkably easy to stalk. These two were stalked and shot one after the other. Later specimens were seen early in the morning and late in the afternoon sunning themselves on branches of small trees close to dense thickets. They are difficult to see, but once spotted are easy to stalk and extremely easy to kill; a few pellets from the gun stops them in their tracks. About eight individuals were seen around the banks and shores of a lagoon 2 km. north of San Miguel. Well established runways within a few feet of the water are apparent here. These are undoubtedly used by other species than *Basiliscus* and *Ctenosaurus*, which were seen here also. The *Basiliscus* would run gracefully and rapidly down these runways. In the more open areas bipedal locomotion was the rule, but over rock falls and outcroppings the hands were used as well. After initially being startled, a lizard would run for some 30 or 40 feet, then freeze and remain motionless until approached to within 7 or 10 feet. They apparently rely heavily on their disruptive color pattern to escape detection. One juvenile specimen, when startled, instead of running around the curve of a 5-foot bay, cut across the water to the trail on the opposite side. Locomotion in the water was still bipedal, with the hind legs virtually entirely submerged at the end of each

thrust. The body and tail, however, remained above the surface of the water. No adults were seen in or on the water. Other specimens were seen in open glades in the thorn forest, frequently far from any sign of a depressed marshy area or temporary pools.

The color pattern of the males and females is not too different. The greatest variation is ontogenetic. The dark-brown transverse bands of the neck, shoulders, and anterior portion of the back are clear-cut and distinct in juveniles, and the light-brown ground color is relatively homogeneous. Juvenile females are speckled with dark brown, particularly on the flanks and abdomen. In larger specimens the pattern is less distinct and somewhat disrupted. In life the longitudinal facial stripe and shoulder stripe are bright-yellow, and the chest and belly are a purplish rusty-red. The second proximal eighth of the tail is of the same color.

Ctenosaurus similis similis (Gray)

Four subadult specimens were collected from Cozumel Island in the vicinity of San Miguel and eleven juveniles from Piste, Yucatán. The species is extremely common at both localities, but particularly abundant in the cleared zones on either side of the road both north and south of San Miguel. The piles of cut trees and brush and the stumps in the cleared area provide good cover and good areas for basking. A large "herd" of lizards grazes in the grass-covered common just north of the church in Piste. *C. similis* seems much more prone to habituate open exposed areas than *C. pectinata*; but it does browse in trees as well. The juveniles from Piste varied in snout-vent length from 64 to 55 mm (av. 60.0). They are bright-green dorsally and light-green ventrally. The body is crossed transversely by bands consisting of dark-brown oval spots on a white field. The anterior edges of these spots are clear-cut but posteriorly fade to a lighter brown and are hazy. The white also fades posteriorly and merges into the green between the bands. About six bands cross the body between the legs; the anteriormost bands are wider, more distinct, and farther apart. The tail is banded by about six dark-brown bands separated by buff bands; the latter are a little narrower than the former. The stomachs of several juveniles examined are filled with insects, including fairly large grasshoppers. Most of the juvenile specimens were caught while they were foraging in the brush and weeds beside the roads in the vicinity of Piste. When partially obscured by such cover, they move and look like *Laemactus*.

Sceloporus lundelli gaigeae (Smith)

One subadult female of this tree lizard measuring 53 mm from snout to vent was collected near Piste, Yucatán. There is a nondescript pattern of

vague streaks and bars on the back, and a poorly developed black collar is present. One other specimen of this shy lizard was also seen high up on the trunk of a large tree in the village.

Sceloporus serrifer serrifer (Cope)

Three males and eight females, mostly juvenile, of this species were collected 9 km north of Merida, Yucatán, on the Progreso Road. These wary lizards were found high on the walls of one of a group of roofless, abandoned masonry farm houses to the west of the road. The adults are extremely wary and alert, and gave us little opportunity to shoot. When alarmed they sought shelter in the cracks of the masonry on the tops of the crumbling walls or beneath what plaster remained. The young are less wary and were relatively easy to collect. The startlingly brilliant yellow and black pattern of spots and bars on the crown of the heads of the juveniles made them particularly easy to recognize from considerable distances.

As is the case in so many species of *Sceloporus*, the females have a bolder melanistic pattern than the males, but the males are more conspicuously ornamented with other colors. In both sexes a conspicuous black collar is present, bordered anteriorly and posteriorly with a white band either one of which may be interrupted medially. The heads of both sexes are boldly marked with light yellow and black. A conspicuous feature of the pattern is the crescent-shaped light mark starting at the posterior corner of the eye and arching up and over the temporals towards the parietals. In juveniles the light area of the crown is a bright yellow. The tail is banded with white and black, this banding being particularly conspicuous in the females. The more posteriorly located dorsal scales and especially the scales of the tail are marked with blue. The black dorsal collar, which ends on the shoulder in females, broadens here in males, then extends across the throat as a narrow, black, uninterrupted band. Anterior to this in males is a diffuse, pale, lavender-blue area which in turn gives way peripherally to pink. The pale-blue flank marks of males are very broadly bordered with black medially, but they are separated by a narrow median white band. The dorsal pattern of the trunk region in males is virtually nonexistent. In females, however, the back is clearly crossed by about four broad transverse dark bands bordered posteriorly with a narrow light area. The keels of the darker scales are more heavily pigmented, giving a streaked effect.

Sceloporus cozumelae (Jones)

Thirty-six specimens of this distinctive small species were collected in the vicinity of San Miguel on Cozumel Island. The series consists of six adult and

seven juvenile males and nineteen adult or subadult and four juvenile females. In life sexual dimorphism is obvious but is less apparent in the preserved specimens. The dorsal surface of the head of males is yellow-brown spotted with flecks of dark brown. The largest flecks occur on the supraoculars and the interparietal. An indistinct gray stripe, two scales wide, starts on the occiput and extends a short distance out onto the tail. On each side a white stripe starts inconspicuously above the auricular opening, crosses above the shoulder where it is most conspicuous, and extends posteriorly past the hind legs. Posteriorly this stripe is partially interrupted by the paravertebral marks. These consist of posteriorly bowed crescentic brown marks, slightly diagonally disposed with the median corner lying farther posteriorly. Each mark is posteriorly bordered with white which tends to merge with the white lateral lines and brightens these lines at this junction. Anteriorly the brown marks are bordered with gray. This border, about two scales long, is as long as the brown marks. The lateral lines are fainter opposite the dark marks. The dark crescents tend to be paired, there being about 12 pairs from the occiput to just posterior to the hind legs. Here the dorsal pattern condenses to a brown, light-centered median line from which short spurs, the remnants of the semipaired body crescents, extend. Above the shoulder is a smoky, black area in the center of which there is a conspicuous yellow spot. A yellowish-white process extends down from the white lateral line towards this spot. The arms and legs are conspicuously crossbarred. The throat and gular region is speckled and reticulated with gray. Flank marks are very faintly indicated by an extremely pale blue area with a median ventral white area between.

The color pattern of the females is quite similar. The darker areas are much darker and narrower, and the light areas are weaker or absent, so that the conspicuous lateral white lines of the males may be lacking entirely or merely indicated. The yellow spot on the shoulder is present and conspicuous. The most distinctive feature of the females is the bright-red "hash" mark extending down the posterior face of the post-auricular fold. The auricular region itself and the lips are also red but not as bright as the post-auricular streak. The throat and gular region of females tends to be more conspicuously spotted and reticulated with dark gray than in the males.

Of the 18 adult females collected, 12 are gravid with moderate to large eggs. In three of these the eggs are uterine and have shells. The largest uterine egg measured from a 47 mm female containing two eggs, was 12.7 x 7.1 mm. The average number of eggs contained in these 12 females is 1.8, the number varying from one to four with two the mode.

The species is almost completely confined to the shores of the island. These shores consist of deeply eroded and fissured limestone with a scanty cover of

low shrubs and herbaceous plants growing in patches of coral and limestone sand or in the rocks. Beaches are virtually lacking. The width of the shore varies from a few feet to 30 or 40 yards. Inland on higher ground the thorn forest abruptly begins. *S. cozumelae* occupies this relatively open area. Juveniles were extremely abundant, but exceptionally wary. They were particularly common in sandy areas between rocks beneath the scanty vegetation which grows here to about 8 inches in height; but they were nearly as numerous elsewhere along the shore. Occasionally adults were found occupying stone walls if such areas were close to the shore, but several abandoned houses near the shore yielded no *Sceloporus* at all. During the time we were on the island the species was active at all hours of the day. But the weather, as has been mentioned, was rainy, overcast, or partially overcast during most of our stay.

Sceloporus chrysostictus (Cope)

Four males and four females were collected 9 km. north of Merida, Yucatán, beside the Progreso Road on the 25th and 26th of June, and 20 males and 19 females on the 3rd, 4th, and 5th of July in the vicinity of Piste.

Usually small scelopetine species are not difficult to collect; but this species, at this time of year at least, proved to be unusually wary. Numerous specimens were seen north of Merida; but in 24 man hours of collecting we were able to acquire only eight. They were most frequently seen along the low limestone walls bordering the fields and roads in fully exposed unshaded areas, but they would also inhabit raised outcroppings or piled-up masses of limestone elsewhere. A cleared area in the immediate vicinity of such rocks or walls seems highly desirable, but not essential. The escape reaction is triggered by the sight of even slowly moving people as far as 50 feet away. The lizards run to rocks if they are in the open, or slip into crevasses and spend an inordinately long time in such retreats before emerging again. When they do emerge it is often at a different place and shielded from the observer. The common scelopetine curiosity is not well-developed in this species.

The most conspicuous feature of the males is a bright-yellowish line, about two scales wide, beginning at the eye, extending well over the shoulder and down the sides, where it is brightest, then on to the base of the tail, where it fades away. Between these two stripes is a broad brown median band about seven scales wide at midbody. In most specimens this area is indistinctly marked with two lateral rows of darker-brown spots diagonally disposed in pairs. These pairs nearly form posteriorly-directed chevrons and occasionally do. In the most distinctly marked specimens nine or ten pairs can be counted. The yellowish lines are subtended in the shoulder and axillary regions with a black band. This fades posteriorly and ventrally, merging into light brown,

then buff, and finally into the white of the ventrum. Gular and flank blotches of contrasting colors, such as blue, are lacking. A spot occurs in the black band above the shoulder, and numerous whitish spots occur on the flanks below the lateral yellow line. The lower lips and head are reddish-brown speckled with black. A narrow vertical black bar extends from the lower palpebral scales to the upper lips; posterior to this is a less well-developed diagonal line also reaching the lips. The tail is marked dorsally with 11 or 12 indistinct dark brown saddle-like blotches.

In most females the basic melanistic pattern is the same as in the males, but the lateral lines are much paler and often nearly lacking. The dark band below the lateral line is virtually the same brown color of the dorsal band but is crossed by vertical darker-brown bars. The dorsal diagonal spots and tail blotches are darker and more distinct and posteriorly are bordered with a lighter color. The most distinctive feature of the females is the bright-red lips, the lower lip being redder than the upper. Occasionally this red extends below the ear to the shoulder. In the less distinctly marked specimens reddish-bronze scales and marks are frequent, especially on the rump.

Four of the fifteen largest adult females are gravid. The egg complement is rather low: two, three, three, and four eggs respectively. These are oviducal, ovoid in shape, measure approximately 13.3 mm in length, and have nearly completely formed shell membranes.

Mabuya mabouya mabouya (Lacépède)

One specimen was presented to us by Mr. E. C. Welling. He collected it at Chichén Itzá on the 22nd of October 1954. We collected another at Piste on the 5th of July 1959, and an additional specimen from Cozumel Island on the 30th of June 1959. This latter specimen was found associated with *Cnemidophorus cozumelus cozumelus* 9 km. south of San Miguel in open forest in the vicinity of "The Lagoon". It closely resembles the mainland form in scale arrangement and color pattern. Its only peculiarity is the fusion of the frontoparietals along their median suture to form a single scale.

Eumeces schwartzei (Fisher)

One adult female, measuring 113 mm from snout to vent, was brought in alive by one of the children in Piste.

The very broad nuchals are followed by 12 pairs of broad cervicals before the median dorsal series commences. The median dorsals in this specimen are only four times as broad as they are long. Other points of difference between this specimen and the composite description of Taylor's (1935:95-96) are as follows: The rostral scale forms a median angle dorsoposteriorly between

the supranasals. The contact between the supranasals is equal to their sutures with the post-nasals. The supranasal-frontonasal sutures are equal to the supranasal-first loreal suture. The frontal is obtusely pointed anteriorly and posteriorly. The interparietal is slightly smaller than the frontoparietals and is enclosed by parietals posteriorly. The lower labials number 8-6. The chin shields are followed posterolaterally by normal scales. There are 58 median scales from the occiput to above the anus and three paired subcaudals posterior to the vent. Aside from these differences, this specimen fits Taylor's description very closely.

Ameiva undulata gaigeae (Smith and Laufe)

Six females and nine males of this magnificent lizard were collected, all from the vicinity of Piste except one male which was found dead on a trail 9 km. north of Merida. Like other races of this species, this form prefers shaded ground, heavily covered with organic debris and humus. Most of the specimens we collected were in dense thickets beside the roads and trails in the vicinity of the town. They were remarkably silent considering their size and the nature of the substrate over which they moved and were difficult to collect. They were active most of the morning from about 8:00 a.m. and again were found late in the afternoon.

These specimens closely fit the original description of Smith and Laufe (1949) except for the greater variation in the number of paired and unpaired median preanal scales. In only two specimens, both females, are all of the enlarged preanals paired. In the rest varying numbers are irregularly paired, the fewest number being two pairs. In one specimen, a female, the pattern is 2s.-1pr.-1s.-1s.

The color pattern in life of the largest males is spectacular. The dorsal surface of the head and tail and the broad median stripe on the trunk are a rich, warm brown. The dorsal surfaces of the appendages are similar but lighter. The arms are marked with deep-brown flecks and the legs with a peculiar oscillated reticulum of the same color. Beginning at the middle of the back irregular dark-brown spots appear, becoming slightly larger posteriorly and extending out the tail. Near the middle of the tail these spots form transverse bars edged with light blue, the posterior edging being lighter than the anterior. The bars extend down the sides of the tail but do not extend onto its ventral surface. Towards the tip of the tail the banding becomes obsolete. The lower jaws, gular region, throat and chest between the arms, and the lower surface of the brachium are an intense, brilliant crimson. The ventral surface of the antebrachium is lightly stained with the same color. In some specimens, however, this red color is replaced with a bright lemon-yellow.

Further studies must be made to determine the basis of this striking dimorphism. The remaining portion of the chest, belly, and lower surfaces of the legs and tail are a clear, pale blue-green. The light marks of the lower lateral dark stripe area, the light areas on the side of the tail, and anterior and posterior faces of the hind leg are a clear greenish-blue. The light areas forming vertical bars in the region of the upper lateral dark line are more or less continuous with the light bars of the lower lateral dark line but are a lighter blue. The dark vertical bars between these blue areas are a deep, rich brown, with black specks forming a diffuse line superimposed on the broader brown bars.

Cnemidophorus cozumelus cozumelus (Gadow)

Inasmuch as the primary purpose of the expedition was to collect *Cnemidophorus*, more time was spent in habitats likely to yield specimens of this genus. The collecting of other species was more or less incidental. A large series of 78 specimens of *C. c. cozumelus* was collected. Upon our return to the University of Colorado it was discovered that these were all females. This sex ratio discrepancy has already been reported upon (Maslin, 1962).

We arrived at Cozumel at 2:15 p.m. of the 26th of June; shortly thereafter it rained, but by 5:00 p.m. we were able to do some collecting. Conditions were poor that afternoon and all of the next day. No *Cnemidophorus* were collected until the morning of the 28th, which was much sunnier, but still partly overcast. We also collected on the 29th and 30th. These lizards were active virtually any time of the day as long as it was neither raining nor too heavily overcast. They seem to prefer a semi-open woodland and avoid dry, barren, open areas. Large numbers were collected by walking along the roads and spotting the specimens by sound beneath the low herbaceous cover beside the road on the humus of the partly shaded thorn-forest floor. A large population was discovered among weeds around an abandoned house. Here numerous individuals were spotted foraging beneath the weeds, which were from one to three feet tall. The floor of the thorn forest has little vegetation during this season but is heavy with humus and twigs. Individuals were frequently collected in open shaded glades on this forest floor not far from the shores. No specimens were found deep in the forest. This habitat is quite different from that selected by *C. d. deppi*, which prefer a much more open area.

The color pattern of the specimens seen or collected is remarkably uniform. The ventral surface of the tail is shrimp-pink and that of the hind legs a lighter pink. The throat, chest, and belly are white. A broad brown band extends down the back and continues, more grayish, out the tail. This band is bordered laterally by a series of greenish undulating stripes separated by deep russet brown stripes, the broadest of which is the third, lying between

the third and fourth light lines (counting dorso-ventrally). The light lines are broken and somewhat reticulated between the shoulder and the ear. The broadest dark band and the light band beneath it extend well out onto the tail, where they become fainter and finally disappear. The juveniles, measuring 33 and 35 mm respectively from snout to vent, have essentially the same pattern. The pink of the tail and hind legs is lacking, the dorsal band is gray buff, the undulating light lines nearly white, and the intervening dark bands a dark brown, nearly black.

Fourteen of the specimens had very large, nearly mature eggs, but still without shells. Twelve others had enlarged eggs, the largest of which measured approximately 3 mm in diameter, and the remainder of the specimens had immature ovaries. This variation in ovarian maturity is correlated with the variation in size of the specimens caught, and strongly suggests that several broods are produced in a season.

Cnemidophorus angusticeps (Cope)

A good series was collected in the vicinity of Pisté and Chichén Itzá. This series consists of 62 males and 60 females. Most of the specimens were collected in open bare areas adjacent to low-growing brush or brush piles. The chief requisite seems to be a nearly barren dry flat area. They were not found in open areas where too much herbaceous cover existed. By far the largest number of specimens were collected in well-cleared cornfields. The piled brush provided by the weeding sufficed for cover, but the brush around the fields and the inevitable stone walls were also used. Specimens were also collected along the motor roads, in the town of Pisté itself, and in the cleared areas adjacent to brush among the ruins of Chichén Itzá. On warmer days individuals appeared at about 9:00 a.m. and remained active until about 1:30 p.m.

One of the most striking features of this race is the existence of unusually well-developed chromatic sexual dimorphism. In the field, the sexes could be easily recognized even with fleeting glimpses. The entire throat of the males is a pinkish-buff. Posterior to the gular fold the chest is a deep blue-black. In extreme cases this color extends posteriorly over the whole belly and out the antero-ventral surface of the thighs. Usually, however, the edges of the scales become increasingly lighter posterior to the chest with a still lighter median zone extending as a widening band to the hind legs. This light median area may be nearly white, but more often it is a pale blue. The light areas of the more laterally disposed ventral scales are rich cobalt blue. The total effect is of a black-chested, blue-bellied lizard. The ventral surfaces of the arms, legs, and tail are cream. Dorsally the males are less vividly marked than the females. The dorsal, dorso-lateral lines are buff, with the dorsolateral line

being a little wider than the other two. There is also present a median dusky light line with ill-defined edges. The two dark-brown bands on either side between the light lines are haphazardly speckled with numerous small buff spots; the flanks below the lateral line and above the ventral plates are usually tessellated with black and buff. The dorsal surface of the hind legs is brown, freely speckled with small light-buff spots. The tail is brown and unmarked, fading distally to a pinkish-buff.

In contrast to the males the females have a white to light-blue throat and no black on the chest or belly, which is usually whitish but occasionally is pale blue. The ventral surface of the tail is a bright dark shrimp-pink, the sides a reddish maroon, and the top a rich brown. In the field the total impression is of a red tail. The ventral surface of the legs is also shrimp-pink and the dorsal surface a dark dried-blood red. The white stripes of the dorsum are whiter and the dark bands between darker. In most individuals these dark bands completely lack the speckling so characteristic of *costatus*, but occasionally in large specimens diffuse spots are present. The dorso-lateral light stripe extends well out onto the tail and the lateral stripe out onto the anterior face of the upper leg. The dorsal surface of the hind legs may be spotted, mottled, or barred with pink spots. The flank tessellation is diffuse or absent. Duellman and Zweifel (1962) have figured a sample of this series to demonstrate the variation which occurs.

Five adult specimens, four males and one female, were collected 9 km. N of Merida on the Progreso Road. The female and one of the males closely resemble the Pistec series. In the remaining three males, however, the light specks in the dark fields are larger and encroach on the light lines so that the lined pattern is less distinct. In one specimen the lined pattern is nearly completely disrupted. This same pattern disruption is seen in some Pistec specimens, but infrequently and not so extensively.

In the entire series there are only two juvenile specimens, a male and a female. These measure, from snout to vent, 41.3 and 38.7 mm respectively. The color pattern of the male resembles that of adult females. The stripes are sharply contrasting white and black; no spots are evident, either in the dark stripes or on the legs. The legs, however, are mottled posterior to the stripe on the thigh, which is a continuation of the lateral stripe. The pinks and reds of the tail and legs are not as bright as they are in adult females. The juvenile female, except for the greater brilliance of the stripes, also resembles adult females. There is, however, a considerable amount of black pigment on the ventral plates, particularly in the lateral abdominal area.

The sexes also differ in size. The mean snout-vent length of the largest 20% of each sex (51 and 53 measured) is 91.3 mm for the males and 79.6 mm for the females. The largest specimen, a male, measures 100 mm from snout to vent.

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