An adult *Cyclura ricordii* in a crevice in múcara east of "Los Olivares."

A two-year old juvenile *Cyclura ricordii* from the lower Barahona Peninsula.

Map of the Barahona Peninsula: The outlined area indicates where we were able to confirm the presence of *C. ricordii*. *Illustration by John Binns.*

Cyclura ricordii on the Barahona Peninsula: A Preliminary Report

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Photographs by Ernst Rupp.

Introduction

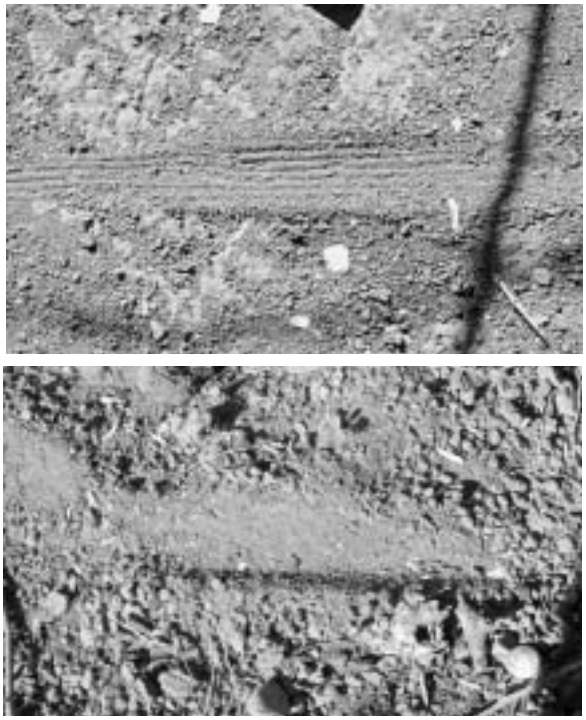
This report summarizes the preliminary results of the survey undertaken by Grupo Jaragua in the Cabo Rojo–Pedernales region of the Barahona Peninsula in the Dominican Republic. The main purpose of the survey was to search for and locate *Cyclura ricordii* habitats and populations in the region. We also assessed threats to the species and the extent of human impact on its populations.

Methods

We initiated fieldwork in December 2002 by identifying key informants and interviewing them about their knowledge of *C. ricordii*. We used photographs of *C. cornuta* and *C. ricordii* to determine if the informant was able to discriminate between the two species. These informants were persons who were known to have spent considerable time in the field and to have an extensive knowledge of the local flora and fauna. "Monteros," hunters of wild pigs and goats, and park rangers from Jaragua National Park were the best sources of information.

Subsequently, we made field trips to the sites identified by the key informants, where the presence or absence of *C. ricordii* was verified by the following methods: (1) Direct sighting with clear identification of an animal being *C. ricordii*. (2) Dead animals, when identification of parts being those of *C. ricordii*. (3) Tail drags: in the fine, reddish soil of the "fondos" (= level plains and depressions), the two species of iguanas leave distinctive tail drag marks. (4) Retreats: individual *C. ricordii* spend considerable time in close proximity to refugia. If an animal is sighted and identified, its retreat often can be found in the vicinity and drag marks also can determine the owner of a specific burrow. (5) Nesting sites: nesting activities of *C. ricordii* began in early April this year and females were active through May. During that period, no nesting activity of *C. cornuta* was verified. Consequently, all nesting attempts and finished nests found during those two months were attributed to *C. ricordii*. We also assumed that nests with signs of emerging hatchlings in July were those of *C. ricordii*. Using GPS (UTM, map datum: NAD 27 of the Caribbean), we recorded all localities where the presence of *C. ricordii* was verified.

In April 2003, we made a reconnaissance flight over the area via a helicopter generously provided by the Dominican Air Force. With experience gained during the fieldwork, we were looking especially for "fondos" that could serve as nesting sites of *C. ricordii*. We supplemented these efforts by using 1999 Landsat satellite images for the same purpose.



Tail drag of *Cyclura cornuta* (top, note the parallel lines) and tail drag of *C. ricordii* (bottom, note the lack of lines).

Results

General.—We verified the presence of *C. ricordii* in a small area (ca. 2 km^2) east of the town of Pedernales and in a larger area (ca. 32 km^2) north and east of the "Los Olivares" location. This area extends northeast to the Cabo Rojo–Aceitillar road.

We have also revisited the following areas: (1) All larger fondos and their surroundings east of the Cabo Rojo-Aceitillar road to an elevation of about 200 m asl (above sea level), (2) fondos and vicinities north and south of the Pedernales-Oviedo road between the 8 and 25 km markers, (3) the Bahía de las Águilas, (4) the Sabana de las Iguanas southeast of Cabo Rojo, (5) the

An active *Cyclura ricordii* burrow in the Fondo de la Malagueta (April 2003).

Vegetation in the Fondo de la Malagueta (October 2003).

Nesting attempts of a female *Cyclura ricordii* in a recently cleared and fenced terrain on the fringes of Los Olivares.

A gravid female *Cyclura ricordii* on múcara (limestone outcrops).

area "Ti Conserva" west of Tru Nicolá, (6) the area southeast of El Cerro, (7) "Cayo de las Iguanas" y "Cayo del Pey" in the Laguna de Oviedo, and (8) the western coast of the Laguna, directly opposite to the mentioned keys. We found signs of *C. cornuta* in all of these areas, but we were not able to verify the presence of *C. ricordii*.

Habitat.—The area limited to the southwest by the Pedernales-Oviedo road and to the east by the Cabo Rojo-Aceitillar road consists of flat plains punctuated by marine limestone terraces. Inside this area we found *C. ricordii* in a mosaic of habitats, which can be classified broadly into three categories: (1) **Fondo:** flat plains and depressions in the ground covered by fine argillic soil of reddish color. The vegetation is open canopy and certainly disturbed. The dominant species are: Cayuco (*Cephalocereus polygonus*), Alpargata (*Opuntia moniliformis*), Bayahonda (*Prosopis juliflora*), and Guasábara (*Cylindropuntia caribea*). During most of the year the ground was barren, but rains in September and October triggered rapid growth of herbs, grasses, and vines. Ricord's Iguanas excavate their burrows in the fondos, which also serve as major nesting sites. (2) **Múcara:** limestone rock outcrops (fig. 7), in which *C. ricordii* seems to show preference for less rugged areas, where holes and cracks serve as retreats. The extent to which Ricord's Iguanas are moving into the more rugged "dogtooth" limestone is unclear. The vegetation has an open canopy, but it is more diversified than in the fondos and the above mentioned species are less dominant. Bayahonda is scarce. (3) **Cascajo:** areas covered by gravel and small boulders. The vegetation seems to be a mixture of the elements that characterize múcara and fondos. After heavy rains, the ground is covered by herbs, grasses, and climbers. Ricord's Iguanas excavate nesting sites and burrows in cascajo.

At about 100 m asl toward the north, the vegetation becomes more dense, the canopy more closed, and the number of tree species more numerous. However, surface conditions can still be classified according to the three previously mentioned categories. *Cyclura ricordii* is present in these areas, and the sites where we found animals approach the limit of 150 m asl proposed by Ottenwalder (1999).

Distribution, Age Structure, and Population Densities.—The smaller subpopulation east of Pedernales includes animals of all age classes. Retreats are in múcara and cascajo. The area is characterized by having been used for slash and burn agriculture (conucism) in the past. Secondary vegetation, with strong presence of Guasábara, is dominant. We did not estimate *C. ricordii* population density because tracing transects in places heavily infested by Guasábara was impossible. *Cyclura cornuta* is present in the area.

"Los Olivares," an area subjected to intensive agriculture and apparently unsuitable for *C. ricordii*, separates the subpopulations. This area is a flat plain characterized by argillic reddish soil. Informants noted that Los Olivares supported a large population of *C. ricordii* before being converted into agricultural land. Aerial photos taken in 1983 showed that the eastern part of the area was still covered by natural vegetation. An irrigation channel built in 1984 also impedes the free movement of animals between the two subpopulations.

Aerial view of part of the outer fringes of "Los Olivares." Note the recent clearing of land in the upper center of the photo and the clearing, which is taking place in the lower right corner.

Aerial view of part of the northeastern fringes of "Los Olivares" showing the Pedernales–Las Mercedes road. Note the waste dump in the center of the photo and recent clearing of land close to the dump.

The larger subpopulation occupies an area that includes the outer fringes of Los Olivares towards the northeast, the marine limestone terraces that surround Los Olivares, and the plain above these limestone terraces. On the plain, one fondo of about 47 ha showed signs of very high Ricord's Iguana activity. This fondo, known locally as "Fondo de la Malagueta," is surrounded by patches of múcara, cascajo, and some smaller fondos. On an approximately 500 m-long transect (40 m wide) through the Fondo de la Malagueta, we counted 63 active burrows in May. Assuming that every active burrow is home to an adult animal, we calculated a density of 31.5 individuals per ha. The methods are certainly very crude and a more detailed investigation is appropriate, but the number gives an idea of the high density of adults in the fondo. We also noted the presence of juveniles and hatchlings. The incidence of *C. cornuta* seems to be low, with signs of activity limited to the southeastern corner of the fondo.

Estimates of population densities outside the Fondo de la Malagueta are more difficult. Based on the availability of suitable cracks and holes in the múcara, we assumed that population density was much lower than in the Fondo. Retreats are not as easily detected in múcara and cascajo as in the fondos. Also, both iguana species are present in this area, and no tail drag marks provided clues to the owners of specific retreats, forcing a reliance on direct observations. Reports by a key informant indicated that some retreats, which have been known over a period of years, had changed in ownership from one species to the other. The idea that suitable retreats in múcara might constitute a limited resource for both species is worth pursuing further.

A second fondo of about 25 ha is known locally as "Fondo de Robinson." In contrast to the Fondo de la Malagueta, we found no burrows. However, indications that the fondo may be an important nesting ground for both species were present. Various retreats of *C. ricordii* in múcara surrounding the fondo could be identified and several juveniles were sighted.

The northern fringes of the flat plain of Los Olivares, which lie adjacent to a limestone terrace, included various smaller localities with active burrows of *C. ricordii.* Part of the land is being cleared for agricultural use, so suitable habitat may soon be lost.

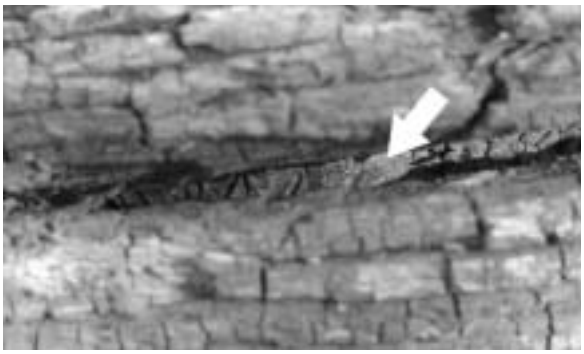
Nesting and Reproduction.—Female *C. ricordii* initiated nesting activities in early April 2003, possibly triggered by rain that fell in the area on 31 March and 1 April. On 8 May, we counted 28 finished nests along the 500-m transect in the Fondo de la Malagueta. We also confirmed nesting activities in the outer

A "finished" *Cyclura ricordii* nest.

A "finished" *Cyclura ricordii* nest in small fondo of about 1.5 x 1.5 m.

Hatchling *Cyclura ricordii.*

Successful hatching is indicated by the hole in this nest.



Hatchling *Cyclura ricordii* hiding inside a hollow log.

Effects of nest trampling by cattle.

fringes of Los Olivares and in many other smaller fondos. In fact, almost any suitable spot seemed to serve as a nesting site. Small fondos of only 1 m^2 contained finished nests. We even found evidence of nesting attempts and a few finished nests in some patches of cascajo.

On 10 July, we found the first nests with signs that hatchlings had emerged. On 20 July along the 500-m transect in the Fondo de la Malagueta, we counted 20 nests from which hatchlings had escaped during previous nights. A rough calculation of ten hatchlings per nest results in a density estimate of 100 hatchlings per ha. That same day, we captured two hatchlings that were hiding inside hollow tree logs on the ground. Considering the number of hollow logs and trees present in the fondo, the availability of suitable retreats may be a limiting resource for emerging hatchlings. The role of adjacent múcara in providing shelter to hatchlings in cracks and holes may be worth investigating.

We encountered nesting female *C. cornuta* in early July. They may have started nesting activities somewhat earlier, but no field trips were possible in June, so definitive data are lacking. Female *C. cornuta* nest in places which also are used by *C. ricordii*, and they start excavating nests before hatchling *C. ricordii* emerge. The impact of this behavior on the reproductive success of *C. ricordii* should be examined.

We only encountered two *C. cornuta* nests in the southeastern corner of the Fondo de la Malagueta. In the major part of the fondo, we found no evidence of nesting *C. cornuta*. *Cyclura ricordii* may have a competitive advantage for reproduction in this fondo.

Threats.—Exotic mammalian predators (e.g., mongooses and cats) are present in the area. We were unable to evaluate the magnitude of their presence and any resulting impact on populations of *C. ricordii*. We noted five free-ranging cattle in the area east of Los Olivares. Trampling of burrows or nests might be occurring. In a relatively small area like the Fondo de la Malagueta, even a minimal number of cattle could cause major damage.

However, habitat alteration and destruction by humans may be of greater concern than the presence of exotics. The area of Los Olivares may well have been a major center of activity for *C. ricordii* in the past. All of this area, except for its outermost fringes, has been converted into intensely used agricultural land. These outer fringes presently are also under pressure, and part of the terrain has been recently cleared of its vegetation. The areas where the two present subpopulations are found may already constitute only small remnants of the total distribution of the species once found in the area.

Trapping of iguanas and excavation of their burrows appear to be quite common in the outskirts of Pedernales. The northeastern fringes of Los Olivares also are affected by these activities. People in Pedernales eat iguanas, although the extent of the problem is unknown. We have submitted a proposal to study this phenomenon and its impact on iguanas to the Pittsburgh Zoo Fund.

The immediate surroundings of Pedernales, where iguanas still can be found, also are threatened by land clearings for housing development projects and a portion of the area is used as a waste dump.

Even an extension of the boundaries of the Jaragua National Park, which was proposed in 2002 under the "Proyecto de la Ley Sectorial de Áreas Protegidas" by the Secretaría de Estado de Medio Ambiente y Recursos Naturales, would protect only part of the area where we confirmed the presence of *C. ricordii*. The marine terrace, "Los Brujos," part of the outer fringes of Los Olivares, and the Fondo de Robinson would be excluded.

Recommendations

In light of the results cited above and fully aware of the critical situation faced by *Cyclura ricordii* in the Pedernales area, we propose the following:

(1) The area of "Los Brujos," including Fondo Robinson and the outer fringes of Los Olivares, should be included in the system of protected areas.
(2) Because the legal procedures necessary for the protection of *C. ricordii* will take time and final results are uncertain, direct measures should be implemented immediately.
(3) The type of landownership and the actual owners of the land that is most threatened by habitat destruction (i.e., the immediate surroundings of Pedernales and fringes of Los Olivares) should be determined. The acquisition of this land would serve to guarantee direct protection of the remaining habitat and facilitate restoration of degraded terrain.

Waste dump in the outskirts of Pedernales; *Cyclura ricordii* is known to occur in the area in the background.

A snare trap used by local inhabitants to catch iguanas.

Remains of a dead iguana that was killed for meat.

(4) Two persons should be employed to monitor the area where *C. ricordii* is present. These persons should be from the local community and should have an excellent knowledge of the terrain and the target species. They should control the persecution of iguanas and stop illegal habitat destruction by surveying the area, advising people regarding harmful practices, and reporting to the appropriate authorities, as necessary.
(5) The socioeconomic aspect of iguana hunting and consumption in Pedernales should be investigated.
(6) Educational programs must be developed that not only address the general public, but will serve to open a dialogue with the target group of persons in Pedernales involved in iguana persecution.

Reference

Ottenwalder, J.A. 1999. Ricord's Iguana, *Cyclura ricordii,* pp. 51–55. In: A. Alberts (comp. & ed), *West Indian Iguanas: Status Survey and Conservation Action Plan.* IUCN/SSC West Indian Iguana Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.

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SPECIES PROFILE

The Ground Lizards (*Ameiva*) of the Lower Barahona Peninsula

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Photographs by Robert Powell.

The Lower Barahona Peninsula is that portion of the peninsula south of the Sierra de Baoruco. Because the region lies in the rainshadow of the mountain range, the lower elevations get little rain and are characterized by dry tropical forest. Until recently, four species of Ameiva were thought to occur in the region: *Ameiva chrysolaema, A. leberi, A. lineolata,* and *A. taeniura.*

Of the four, *A. lineolata* is the smallest (maximum known snout-vent length = 59 mm) and the most xerophilic (tolerant of harsh, dry conditions). This species, featuring a bright blue tail and feet, has a disjunct range in similar habitats across the island of Hispaniola. A*meiva taeniura* is intermediate in size (SVL to 103 mm), the least drought tolerant, and is restricted largely to the relatively few and scattered moist microhabitats. Although, at some sites, one can stand in one place and see individuals of different species, closer observation reveals that *A. taeniura* only rarely leaves the cooler, shaded areas where canopy cover is relatively dense.

In the same study that revealed the habitat association of *A. taeniura,* the authors found no significant differences in microhabitat use by *A. chrysolaema* and *A. leberi,* which are comparable in size (SVL to 160 mm in some populations). The former species is widely distributed across Hispaniola, whereas the latter is known only from the peninsula. They are distinguished in that the back and sides of *A. chrysolaema ficta,* the subspecies found in the area, is distinctly patterned, whereas A. leberi is unicolored. Because other populations of *A. chrysolaema* are known to have unicolored pattern variants and because no ecological differences were evident, the authors suggested that *A. chrysolaema* and *A. leberi* were, in fact, pattern variations of a single species. More recent genetic studies have verified that contention.

One of those studies also determined that *A. chrysolaema* from the peninsula was distinctive relative to populations elsewhere on Hispaniola. This is not surprising, because the island actually is a composite of two paleois-