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Zelleriella bayonai n. sp. and *Nyctotherus uscae* n. sp. (Protozoa) from *Leptodeira maculata* (Colubridae) of Guatemala, C.A.

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Abstract: Protozoans found in the posterior intestine of *Leptodeira maculata* taken in Monterrico, Taxisco, Santa Rosa, Guatemala, correspond to: *Zellereilla boyonai* n. sp., and opalinid of ellipsoidal character (56–181 x 33–100; 126.84 x 76.19 μm), disposition and size nuclei (diameter 7–24; 15.82 μm), with uniform citoplasm; *Nyctotherus uscae* n. sp., a heterotrichous ciliate, typically ovoid (100–132 x 66–92; 117 x 78 μm) whose peristome (42–56; 49 μm) is hook shaped, extending from about the ecuatorial level and passing below and parallel to the macronucleus (34–43 x 15–25; 39 x 20 μm) which is more or less triangular in shape. The relationships among *Zelleriella* spp. and *Nyctotherus* spp. in reptiles are discussed.

The opalinids include stenoxenic endocommensal species of amphibia, an ocassionally of fishes and reptiles. They used to be associated with heterotrichous ciliates of the family Nyctotheridae Amaro, 1972 with a wider range of specificity; however, most *Nyctotherus* are known as endocommensals of amphibia and in lesser proportion, insects, myriapods, oligochaets, molluscs, reptiles and fishes (Cunha and Penido, 1926; Metcalf, 1940; Earl, 1972).

Previous works in which the presence of *Zellereilla* sp. and *Nyctotherus* sp. are reported for reptiles are listed below: Grassé (1928) described *N. haranti* as a new species found in *Tarentola mauritanica,* collected in Tunes. In Australia, Johnston (1932) originally described *N. trachysauri* from *Trachysaurus rugosus.* Carini (1933 a-c) described *Z. jaegeri* from *Liophis jaegeri* and *Z. biopavae* found in *Ophis merremi* and also as new species *N. amaralli* (from *Leimadophis poecilogyrus*), *N. jaegeri* (of *Liophis jaegeri*), *N. coralli* (of *Pseudoboa rombifer*) and *N. biopevae* (of *Ophis merremi*). The snakes used for that work were caught in Brasil. Wood (1935) reported the presence of *Nyctotherus* sp. in the intestine of *Xantusia vigilis* and *Sauromalus obesus* in California. In the Antilles, Wenrich (1935) reported *Zelleriella* sp. in a boa. Geiman and Wichterman (1937) described as new species *N. teleacus* and *N. kyphodes* from the intestine of three tortoises, species *Testudo vicina, T. elephantina* and *T. hoodensis* from the Galapagos Island. Carini (1938, 1939) inicially reported *N. jaboti* from *Testudo denticulata* and *T. tabulata* and described *N. amphisbaenae* as new species in the apodous saurian *Amphisbaena vermicularis* from Brasil. Hegner (1940) obtained *N. beltrani* from the intestine of two iguanids *Ctenosaura acanthura* captured in Morelos, México, and he described it as new species. In Paraguay, Shouten (1940) redescribed *N. jaegeri* Carini, *N. boipevae* Carini and *N. coralli.* Carini found them in *Rhadinae jaegeri, Leimadophis poecilogyrus* and *Pseudoboa rombifer,* and the also reported *N. sokoloffi* as new species of heterotrichous ciliate found in the apodous saurian *Amphisbaena albocingulata.* Beltrán (1941) described *Z. leptodeirae* from the intestine of *Leptodeira maculata* which inhabits in Jalisco, México. Fantham and Porter (1950) found *N. ophidiae* in the intestine of *Ablabophis rufulus* and *Baedon lineatum* from South Africa for the first time. Amrein (1952) described *N. woodi* of the saurians *Xantusia henshawi, Dipsosaurus* dorsalis and *Sauomalus obesus* from California, U.S.A. In Tunes, de Puytorac (1954)

found *N. scinci* in the saurian *Scincus scincus*. Janakidevi (1961) described *N. hardwickii* found in the intestine of 15 saurians *Uromastyx hardwickii* from Bombay, India. A collection of the ciliate endocommensals heterotrichids species was recently completed by Albaret (1975).

MATERIAL AND METHODS

The protozoans were obtained from the posterior portion of the intestine of two "cantil" (*Leptodeira maculata*), caught in Monterrico, Taxisco, Santa Rosa, Guatemala, on July 1978. The samples were fixed in alcohol-formalin-acetic acid. After through shaking the samples were sieved twice and passed to a test tube (13 x 100) in which they were rinsed with distilled water and stained with Van Cleave and/or DelaField hematoxylin. Solutions were carried out centrifugated at 1500-2000 r.p.m. to recover the sample, which was dehydrated in alcohol series, transparentated in xilol and mounted in neutral synthetical resin. 150 *Zelleriella* and 25 *Nyctotherus* samples were measured microscopically. The drawings were based on microphotographs and microproyections. Values are given in micrometers (μm) according to the plane indicated in figure 1 for *Zelleriella* and figure 2 for *Nyctotherus*.

RESULTS

Zelleriella bayonai n. sp.
(Figs. 3, 4, 5; Tables 1,2)

Description: Cell openly ellipsoidal, without notable difference in the anterior ending, stria covered with cilia in oblique direction with regard to the transversal plane of the cell. There is not difference between endoplasm and ectoplasm. Vesicular nuclei aproximately equal in size, the previous one located at the longitudinal half line and over the ecuatorial level of the body, and the posterior one located below this level, generally slanted toward one of the sides of the longitudinal half line.

Host: *Leptodeira maculata* (Colubridae).
Localization: Last portion of the intestine.
Geografic Distribution: El Rinconcito, Monterrico, Taxisco, Santa Rosa, Guatemala.

Discussion: These opalinids with flattened bodies and two nuclei belong to the genus *Zelleriella* Metcalf, 1920, which is composed of species described almost exclusively from amphibia, with a few reported in fishes and reptiles (Cunha and Penido, 1926; Metcalf, 1949; Sandon, 1980). Three species of this genus have been reported in reptiles: *Z. leptodeirae* Beltrán, 1951 (Fig. 5a); *Z. jaegeri* Carini, 1933 (Fig. 5b) and *Z. biopevae* Carini 1933 (Fig. 5c). *Zelleriella bayonai* differs from other species in the shape of the body which is openly ellipsoidal, and in the position of the nuclei. The species closer to *Z. bayonai* is *Z. biopevae*, according to the morphometrics data (Table 2). However, the position and diameter of the nuclei indicate that it is a new species, since the standard deviation of *Z. bayonai* shows a high degree of homogeneity, mainly about the greater diameter of their nuclei.

The species is dedicated to the mexican microbiologist Armando Bayona-González (taking the singular masculine of his first name).

Nyctotherus uscae n. sp.
(Figs. 6, 7, 8; Table 3)

Description: Oval cell flattened laterally, covered by parallel stria of cilia of uniform length. They are larger and thicker at the peristome level (cirrus). There is no kariophore. Macronucleus almost triangular in shape with the posterior side flattened and parallel to the infundibulum, positioned aproximately at 40° from the transversal half line, anterior convex part with its lateral extreme narrower, directed toward the peristome and the opposite extreme oblique to longitudinal plane ending in the equatorial level of the cell. Posterior end of the cell rounded in more than one third of its last portion, under the transversal half line. The peristome occupies one third of the ventral part and continues toward the apical extreme. The cytopyge forms a right tube that is opened in the antapex and continues in oblique direction toward the ventral side of the cell. The measurements are given in Table 3.

Host: *Leptodeira maculata* (Colubridae).
Localization: Last portion of the intestine.
Geographic Distribution: El Rinconcito, Monterrico, Taxisco, Santa Rosa, Guatemala.

Discussion: The species *Nyctotherus* Leidy, 1849 obtained in reptiles does not have kariophore (Fig. 8). Our species differs from

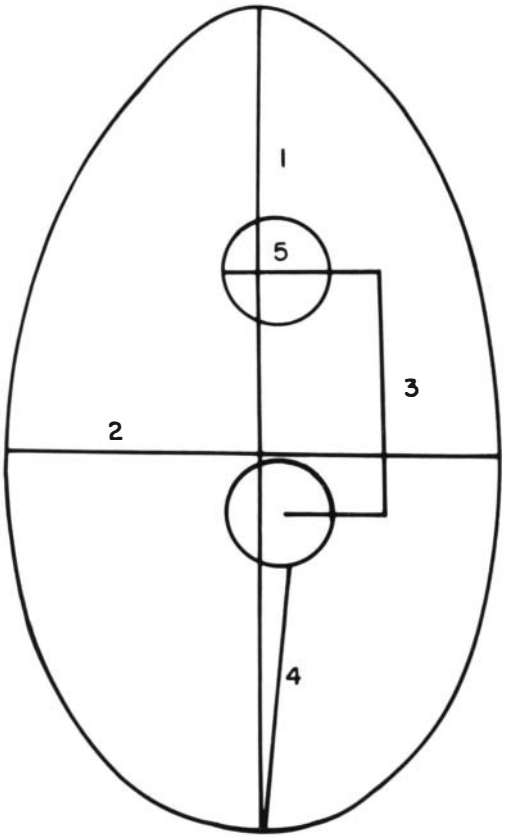

Fig. 1. Planes used for measuring *Zelleriella bayonai* n. sp.: (1) Maximum length of the cell; (2) Maximum width; (3) Distance between nuclei; (4) Major distance between the nucleus and cellular membrane; (5) Diameter of the major nucleus.

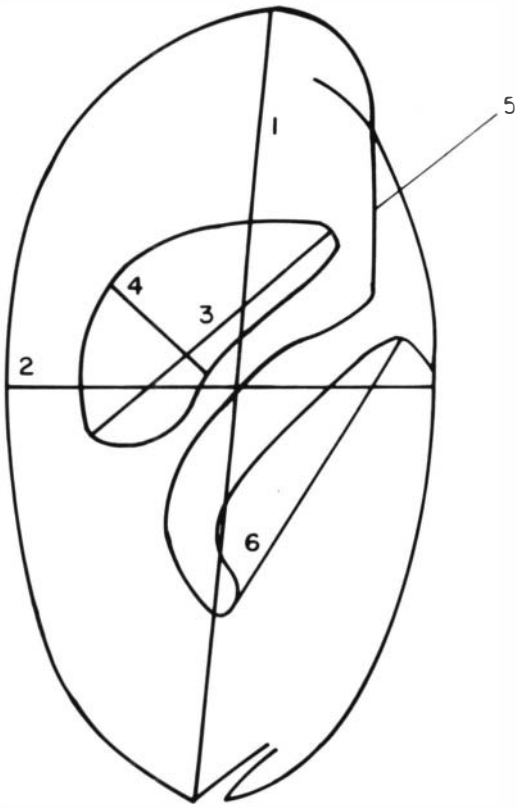

Fig. 2. Planes used for measuring *Nyctotherus uscae* n. sp.: (1) Maximum length of the cell; (2) Maximum width; (3) Length of the macronucleus; (4) Width of the macronucleus; (5) Preinfundibulum length and (6) Infundibulum length.

TABLE 1

Morphometrics of Zelleriella bayonai: *LC = Length of the cell, WC = Width of the cell, NCM = Major distance between the nucleus and cell membrane, NN = Distance between the nucleus and DM = Diameter of the greatest nucleus.*

References	Min.	Mean	Max.	Standard distribution
L C	56	126.84	181	22.31
W C	33	76.19	100	12.34
N C M	20	47.87	84	8.70
N N	6	18.37	31	6.23
D N	7	15.82	24	2.78

TABLE 2

Comparison of the measurement in micrometers between the different species of Zelleriella, *endocommensals in reptiles.*

	Length		Width		Diam. nucleus	
Organism	Min.	Max.	Min.	Max.	Min.	Max.
Z. leptodeirae	46	78	36	56	7	12
Z. jaegeri	60	73	34	42	10	12
Z. biopevae	100	150	60	90	12	15
Z. bayonai n. sp.	56	181	33	100	7	24

N. ophidiae Fantham and Porter, 1950 (Fig. 8a) because it has a spiralated infundibulum, and in the shape of the macronucleus and body.

It differs from *N. coralli* Carini, 1933 (Fig. 8b) because it does not have a wide infundibulum which is directed obliquely, and an oval macronucleus. It differs from *N. woodi* Amrein, 1952 and *N. trachysauri* Johnston, 1932 (Fig. 8c and 8d respectively) because both posses a peristome that is opened anteriorly at the

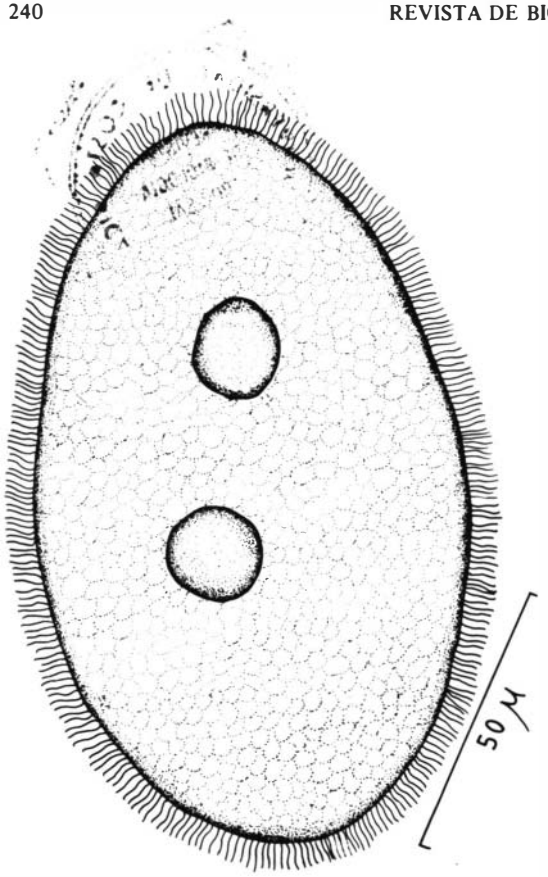

Fig. 3. *Zelleriella bayonai* n. sp.

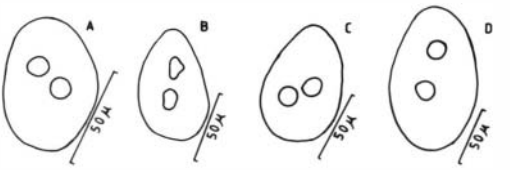

Fig. 5. Comparative scheme of *Zelleriella* species, obtained from reptiles: (a) *Z. leptodeirae*, (b) *Z. jaegeri*, (c) *Z. biopevae* and (d) *Z. bayonai* n. sp.

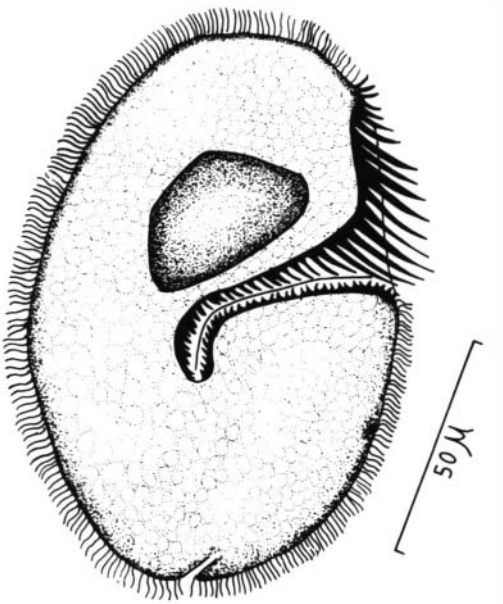

Fig. 6. *Nyctotherus uscae* n. sp.

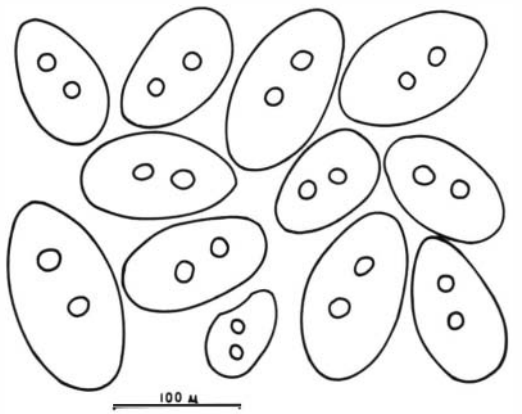

Fig. 4. Some samples of *Z. bayonai* population taken at random for description. Sandon (1976, 1980) pointed out that "...neither verbal description nor morphometric statistics can be relied on for species distinction in these organisms and the most useful description is that given by a series of photograhs or drawings showing as completely as posible the range of forms found within species".

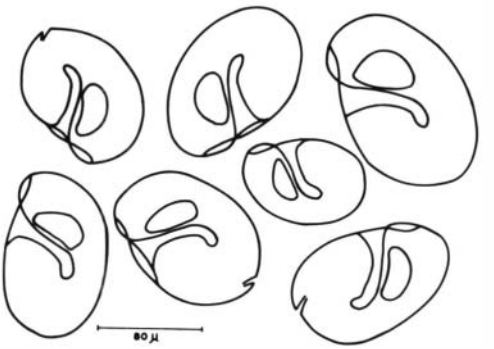

Fig. 7. Random selection of *N. uscae* shapes.

ventrum and because it does not have a macronucleus parallel to the infundibulum. These morphologic differences as well as the homogeneity in the population of this organism (Fig. 7), as shown by the standard deviation (Table 3), are the reasons for proposing this as a new

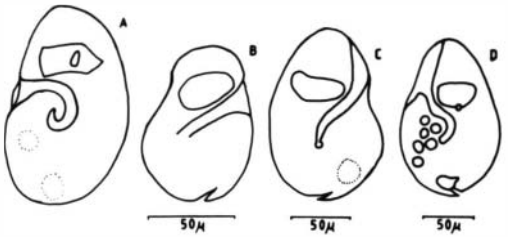

Fig. 8. Scheme of *Nyctotherus* species that do not have kariophore. They are similar to *N. uscae,* obtained from reptiles: (a) *N. ophidiae,* (b) *N. coralli,* (c) *N. woodi,* (d) *N. trachysauri.* In 1928 Grassé divided the genus *Nyctotherus* into two subgenera: *Nyctotherus* (*Nyctotherus*) Leidy, 1849 including forms that have kariophore, and *Nyctotherus* (*Nyctotheroides*) Grassé, 1928, with forms that lack a distinct kariophore. Corliss (1961) considers these subgenera as different genera (Amaro & Sena, 1967a, 1967b).

species, named *Nyctotherus uscae* according to the genitive singular femenine of the University of San Carlos, Guatemala to which we are grateful for the facilities given for this research.

RESUMEN

Se describen varios protozoos de la porción posterior del intestino de la culebra *Leptodeira maculata,* de Monterrico, Taxisco, Santa Rosa, Guatemala: *Zelleriella bayonai* n. sp., un opalínido que se caracteriza por su forma francamente elipsoidal (56–181 x 33–100; 126.84 x 76.19 μm), disposición y tamaño de sus núcleos (7–24; 15.82 μm de diámetro) y citoplasma uniforme; *Nyctotherus uscae* n. sp., un ciliado heterotríchido típicamente ovoide (100–132 x 66–92; 117 x 78 μm), peristoma (42–56; 49 μm) en forma de gancho que se extiende por arriba del nivel ecuatorial de la célula pasando por abajo y paralelo al macronúcleo (34–43 x 15–25; 39 x 20 μm), que es aproximadamente de forma triangular.

TABLA 3

Morphometrics of Nyctotherus uscae n.sp.: LC = Length of the cell, WC = Width of the cell, LM = Length of the macronucleus, WD = Width of the macronucleus, PL = Preinfundibulum length and IL = Infundibulum length.

Reference	Min.	Mean	Max.	Standard distribution
L C	100	117	132	8.1
W C	66	78	92	6.6
LM	34	39	43	2.8
W M	15	20	25	2.7
P L	35	40	59	5.4
I L	42	49	56	2.6

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