Presence of Parasite Remains in Historical Contexts in the City of Córdoba, Argentina, in the Nineteenth Century

Darío Alejandro Ramirez, Henrik Bernhard Lindskoug, and Rodrigo Nores

*We conducted a paleoparasitological study on sediment samples from two trash pits and a cesspool, collected during an archaeological assessment of a building located in the historic downtown of the city of Córdoba, Argentina. People have used these premises for residential and commercial purposes since the beginning of the seventeenth century, although the samples analyzed correspond to nineteenth-century contexts. Light microscopy examination revealed the presence of parasite eggs of whipworm (*Trichuris *sp.), possibly roundworm (*Ascaris lumbricoides*), and tapeworm (taeniid). The presence of these fecal-oral and food-borne transmitted helminths supports other lines of evidence that indicate poor sanitation and hygiene habits and inadequate food processing, which may have contributed to the high incidence and mortality of gastrointestinal diseases recorded at that time. The paleoparasitological data agree with the historical information on the health status of the populations that inhabited the city of Córdoba in the past, especially in relation to their habits and diet.*

Keywords: archaeological assessment, paleoparasitology, endoparasite, parasitism, sanitation, health

*En el presente trabajo llevamos adelante un análisis paleoparasitológico en sedimentos de dos basureros y un pozo negro, recolectados durante un estudio de impacto arqueológico en un edificio ubicado en el centro histórico de la ciudad de Córdoba, Argentina. Esta propiedad se utilizó con fines residenciales y comerciales desde principios del siglo XVII, aunque las muestras estudiadas corresponden al siglo XIX. Los análisis mediante microscopía óptica revelaron la presencia de huevos de parásitos tricúridos (*Trichuris *sp.), posibles ascarídidos (*Ascaris lumbricoides*) y céstodos (ténidos). La presencia de estos helmintos de transmisión fecal-oral y alimentaria está en consonancia con otras líneas de investigación que indican condiciones sanitarias y hábitos de higiene insuficientes, así como un procesamiento inadecuado de los alimentos, lo que podría haber contribuido a la alta incidencia y mortalidad de enfermedades gastrointestinales registradas para ese momento. La información obtenida mediante los análisis paleoparasitológicos concuerda con los datos históricos disponibles sobre el estado de salud de las poblaciones que habitaron la ciudad de Córdoba en el pasado, especialmente en relación a sus hábitos y dieta. En este sentido, destacamos la contribución de estos estudios en contextos urbanos pasados para conocer la diversidad de parásitos y su relación con prácticas culturales y procesos sociales.*

Palabras clave: impacto arqueológico, paleoparasitología, endoparásito, parasitismo, sanidad, salud

Paleoparasitology sheds light on human behavior patterns and ecological transitions through time. Thus, it contributes valuable information about diet and health status of past populations, as well as knowledge on migration routes, cultural practices, and

Darío Alejandro Ramirez ■ Instituto de Antropología de Córdoba (IDACOR), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Universidad Nacional de Córdoba (UNC), Córdoba, Argentina (darioaramirez@mi.unc.edu.ar)
Henrik Bernhard Lindskoug ■ Instituto de Antropología de Córdoba (IDACOR), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Universidad Nacional de Córdoba (UNC); Departamento de Antropología, Facultad de Filosofía y Humanidades, Universidad Nacional de Córdoba (UNC); Centro de Investigaciones "María Saleme de Burnichon" (CIFFyH), Facultad de Filosofía y Humanidades, Universidad Nacional de Córdoba (UNC), Córdoba, Argentina (henrikblindskoug@unc.edu.ar)
Rodrigo Nores (rodrigonores@ffyh.unc.edu.ar, corresponding author) ■ Instituto de Antropología de Córdoba (IDACOR), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Universidad Nacional de Córdoba (UNC), and Departamento de Antropología, Facultad de Filosofía y Humanidades, UNC; Museo de Antropología, Córdoba, Argentina

Latin American Antiquity 33(2), 2022, pp. 395–407

doi:10.1017/laq.2021.68

settlements used by these groups (Araújo et al. 2013). Coprolites (desiccated/mineralized feces) and sediments are the main sources of paleoparasitological studies, which aim to detect and identify helminths and protozoa remains. Paleoparasitological findings can be linked to skeletal individuals (Fugassa and Barberena 2006; Fugassa and Dubois 2009; Jaeger, Taglioretti, Dias, et al. 2013; Jaeger, Taglioretti, Fugassa, et al. 2013; Ramirez, Vieira de Souza, et al. 2021) or to common-use structures like cesspools and latrines, as well as occupational layers (Anastasiou and Mitchell 2013; Côté et al. 2016; Hald et al. 2018; Maicher et al. 2017; Mitchell et al. 2011; Reinhard et al. 2008; Seo et al. 2016; Trigg et al. 2017; Yeh et al. 2019). In the Americas, paleoparasitological studies on samples from common-use structures in urban contexts are scarce, being restricted to the United States (Reinhard 1989; Reinhard et al. 2008; Warnock and Reinhard 1992). In Argentina, paleoparasitology has focused instead on animal coprolites, regurgitated pellets, and sediments (Beltrame et al. 2010, 2020; Fugassa 2006; Fugassa and Dubois 2009; Petrigh et al. 2019). In the central region of the country where this study is located, recent paleoparasitological research has reported the presence of parasite eggs in pelvic sediments from individuals dated from the Late Holocene (Ramirez, Vieira de Souza, et al. 2021).

The city of Córdoba, capital of the province of the same name, is located in the central region of Argentina, in the foothills of the Sierras Chicas on the Suquía River. Founded in 1573 by Jerónimo Luis de Cabrera, it is one of the earliest Spanish colonial cities of the region. The city has many historic buildings and monuments dating back to its colonial origins, the most important being the Jesuit block, which includes several buildings from the seventeenth century. Despite its important colonial legacy, few archaeological excavations have been carried out in the historic center, and most of them are related to rescue archaeology (Berberián et al. 2008; Brizuela and Mignino 2020; Izeta et al. 2014, 2017; Lindskoug et al. 2011; Marschoff and Lindskoug 2020). The urban development of the city has increased markedly during the last several decades with the construction of residential and commercial buildings. The city is divided into three risk zones (low, medium, and high) with different levels of heritage protection based on the possibility of encountering archaeological remains during construction (Municipalidad de Córdoba 2011). The founding area in the city is a zone of 70 blocks, which were divided and distributed in 1577 to the first inhabitants of Córdoba (Luque Colombres 1980): it is characterized as high risk because of the high possibility of uncovering vestiges from colonial times during construction works. Municipal ordinance 11935 requires mandatory archaeological excavations to document and preserve structures with historical value within this zone.

As mandated by this ordinance, an archaeological assessment with stratigraphic excavation was carried out during 2017–2018 in three plots located at 326/344/360 San Jerónimo Street, site code MC.SJ344 (Lindskoug, Marschoff, and Gabriel 2019; Lindskoug, Vives, and D'Agostino 2019; Marschoff and Lindskoug 2020; Marschoff et al. 2017; Marschoff, Lindskoug, Galimberti, et al. 2018; Marschoff, Lindskoug, and Vives 2018), where a four-story parking garage, including a subterranean floor, was to be built (Figure 1). Historical documents of the city of Córdoba show that the plots were mainly used as residences, although this varied over time; their use alternated between commercial and residential purposes (Gabriel 2020; Marschoff et al. 2017). To record the contexts, a stratigraphic excavation was done, using single-context planning following the guidelines of the MOLAS site manual (Westman 1994) with minor modifications to adapt to local conditions (Marschoff et al. 2017). We also used the Harris Matrix (Harris 1989) to register the stratigraphic sequence of the site in great detail. In total, we recorded 468 contexts at the site, including not only sediment deposits but also several structures with different functions and chronologies, such as walls, wall foundations, floors, drainage systems, trash pits, and cesspools. More than 30,000 artifacts were recovered during the excavation, mostly corresponding to animal bones associated to trash pits. Most of the trash pits were located in the southern part of the plots, an area that was interpreted as patios or backyards. The trash registered in several of the

Figure 1. Location of 326/344/360 San Jerónimo Street in the center of the city of Córdoba (white dot). Plan view of the archaeological site with the three contexts where the samples were taken (right) and map of the province of Córdoba in Argentina (left).

deposits (fillings) seems to correspond to secondary trash deposits. Before excavations started, we had identified historical sources indicating that the first constructions were built in the area in the beginning of the sixteenth century (Gabriel 2020; Luque Colombres 1980). However, most of the subterranean remains found could be dated to the nineteenth century. The buildings torn down by the construction company were built in the late nineteenth century, including the facade, which was preserved and integrated into the new parking garage (Marschoff et al. 2017; Marschoff, Lindskoug, and Vives 2018; Marschoff, Lindskoug, Galimberti, et al. 2018).

Given that little is known about the impact of parasitism in this past context, we conducted a paleoparasitological analysis of the sediments of two trash pits and a cesspool from nineteenth-century premises in the city of Córdoba: its objective was to assess the parasite diversity present and infer the cultural practices and sanitary conditions in this historical context.

Materials and Methods

The Site and Archaeological Context

The site studied has an area of 1,200 m^2, from which 875 m^2 were excavated during this archaeological assessment (Marschoff, Lindskoug, and Vives 2018). Sediment samples from three archaeological contexts (306, 356, and 414) were examined. Analysis of the stratigraphic information from the excavation helped us understand the archaeological context of the samples and to identify different activity areas in the three plots. The stratigraphic analysis indicates a chronology of the samples no older than the mid-nineteenth century and the beginning of the twentieth century. Complete associated information of the relevant contexts and their interpretation is presented in Supplemental Table 1.

The area associated with context 306 functioned as a patio or backyard since the first constructions on the plot (Luque Colombres 1980; Marschoff and Lindskoug 2020). Structure 306 was interpreted as a cesspool and appears to have been associated with a kind of sewage drainage system constructed in the back of the central plot at 344 San Jerónimo Street; it also must have been associated with structure 304, which is possibly another cesspool and is located less than 1 m from structure 306. Structures 304 and 306 had similar construction techniques: both their northern and southern walls were constructed with bricks, and their western and eastern walls were made of a mixture of bricks and stone masonry. Several other features, such as floors and walls in the patio, were constructed

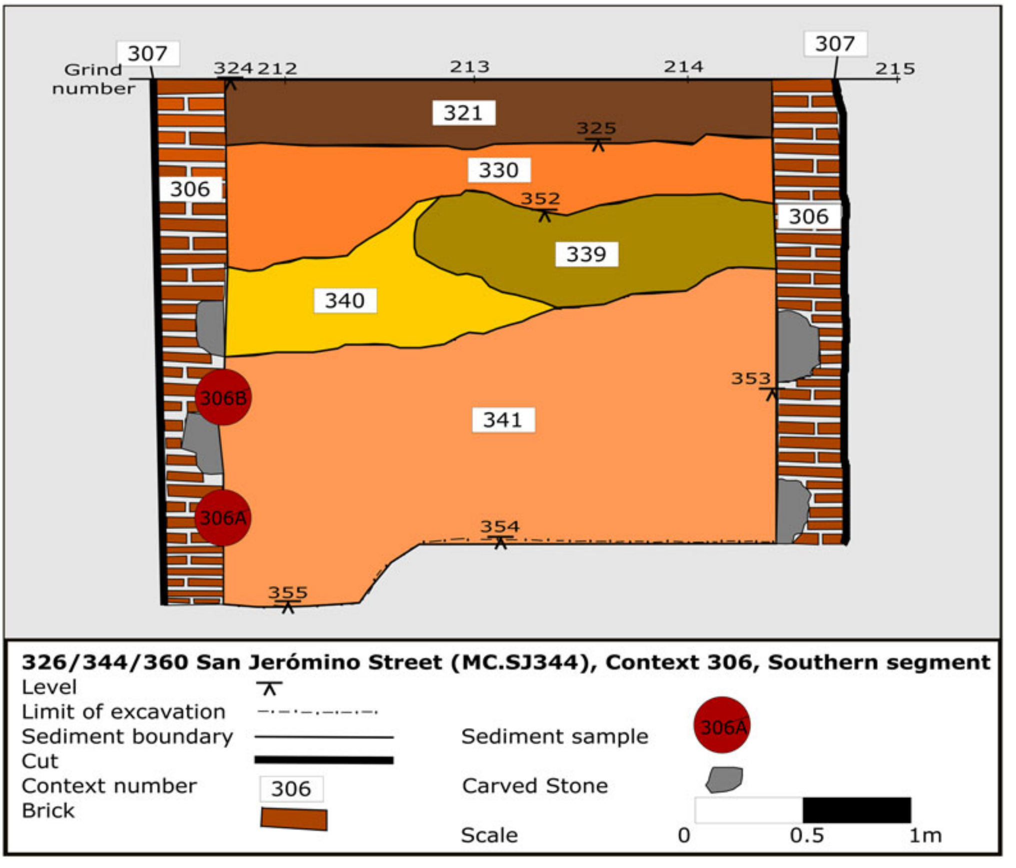

Figure 2. Stratigraphic section with the layers of fills identified in the southern segment of context 306. The position where samples 306a and 306b were obtained is indicated.

with similar bricks (contexts 38, 198, 218, and 309), and were likely built simultaneously, associated with the erection of the last major construction on the plot in the beginning of the twentieth century. Both structures were completely sealed with a cement floor (context 8) during the twentieth century, but most likely these cesspools had already been out of use for some time. The only visible outlet from the two structures was a connection to a stoneware drainage tube (context 309).

The filling of the cesspool (context 306) corresponds to at least five layers (Figure 2; contexts 321, 330, 339, 340, and 341) that were likely deposited in two major events; it seems to be associated with the construction of the last building on the plot in the beginning of the twentieth century. The first event includes contexts 339, 340, and 341, sealed and flattened by context 330, perhaps from the destruction of an old brick wall or something similar, as evidenced by the large amount of building material in the deposits. The second event of filling, context 321, contains building material, glass, metal and plastic elements, but no animal bones, covered by a cement floor (context 8). Because Structure 306 is large, we obtained two samples from different depths: 306a from 2.0 m and 306b from 1.4 m (Figure 2). It is important to consider that although the samples were taken from the brick joints because remnants of the original cesspool contents could be kept there, the parasite remains found could belong either to the cesspool itself or to its filling (context 341), which was in contact with the cesspool walls.

The area where context 356 was registered has also been identified as a patio or backyard, located in the southeastern corner of the plot at

360 San Jerónimo Street. The deposit was a sediment with a mid-blackish-brown color interpreted as a trash pit and included animal bones, charcoal fragments, broken glass, and ceramic material. This deposit was associated with other contexts (331, 357, 358, 359, 372, 373, 374, 376, 377, 391, 392, and 393) and was sealed sometime during the late nineteenth or the beginning of the twentieth century by a brick floor (context 40), which is similar to another brick floor (context 38) in the adjacent plot 344. During the twentieth century, more cement floors were added (contexts 18, 24, and 48). The trash pit (context 356) was created by digging (a cut, context 392) a subcircular hole (2 × 1 × 2 m) in another sediment deposit (context 331), interpreted as a sediment filling with a high content of trash. A stone structure (context 372) made with selected and carved rocks seems to be associated with the trash pit. It seems likely that this stone structure was constructed for another purpose but may have been reused for the disposal of trash.

This patio or backyard seems to have been associated with several events (contexts 391, 392, and 393) related to the digging of different trash pits: most of the deposits in the area have a high content of trash, including ashes, charcoal, glass fragments, animal bones, and ceramic material. A preliminary study of the trash in context 356 suggests that it originated in a domestic unit or commercial premises of the late nineteenth or early twentieth century, when it was sealed. It includes mostly secondary domestic trash: broken glass and crockery of industrial manufacture, ceramic material, charcoal fragments, and nonarticulated animal bones (Table 1).

Table 1. Archaeological Materials from the Studied Contexts.

Archaeological Material	Context 306/ 341	Context 356	Context 414
Animal bones	–	+	+
Ceramic	–	+	+
Glass	+	+	–
Metal	–	+	–
Crockery	–	+	–
Building material	+	+	–
Lithic	–	+	–
Charcoal	+	+	–
Plastic	–	–	–

We interpreted context 414 as a trash pit. Stratigraphically, it was registered under a filling of a subfloor (context 413). Context 414 could be associated with context 418, which would have been part of a larger trash pit that was separated when digging the foundation of a brick wall (context 20) to divide plots 344 and 360 on San Jerónimo Street. The trash in context 414 corresponds mostly to animal bones and ceramic fragments and was interpreted as coming from a domestic unit, with a mid- to late nineteenth-century chronology.

The sediments were taken by scraping the profile or walls of each context, after removing a first film of sediment. We used disposable sterile tools and changed them between samples. Control samples were taken from the outside of each context to eliminate the possibility of environmental contamination.

Paleoparasitological Analyses

To obtain as much information as possible about the diversity of parasites in these sediments, two standard procedures were followed for paleoparasitological examination. In one method, we applied a rehydration of the samples (Callen and Cameron 1960), followed by a spontaneous sedimentation technique (Lutz 1919). Initially, 5 g of each sediment was rehydrated in 0.5% trisodium phosphate solution at 4°C for 72 hours with constant agitation. Then, they were strained through a double-folded gauze into a funnel and left to settle in a conic jar for 24 hours. After discarding the supernatant, 5 mL from the suspension at the bottom of the jar were recovered. The second procedure we followed involved disaggregation of 5 g of sediment in 10% hydrochloric acid, using the method of Reinhard and colleagues (2008). After several washing steps, the material was resuspended with ultrapure water in a final volume of 10 mL. Finally, slides were prepared and observed with an optical microscope (Labklass XSZ 107 CCD) with 100× (total magnification). The parasite remains were photographed with 400×, and all the eggs were measured with TCapture 4.3.0.605 software. A semiquantitative approach was applied to estimate the number of eggs per gram (epg) in each sample. Because we observed 200 μL of suspension with both techniques, epg was calculated by multiplying the total number counted by 5 for the spontaneous-sedimented samples and by 10 for the acid-treated samples. The identification of parasites was made based on their morphological and morphometric characteristics (Atías 1998; Muller 2002).

Paleogenetic Analysis

To identify the genus of the tapeworm eggs, we carried out paleogenetic analyses. Two hundred µl of rehydrated sediment were subjected to ancient DNA (aDNA) extraction. Initially, we employed a thermic shock treatment to break down the thick walls of parasite eggs, followed by incubation with an extraction buffer containing 50 mM Tris-HCl, 100 mM NaCl, 3% SDS, 50 mM EDTA pH 8.0, 2 mg/mL Proteinase K, and 40 mM DTT, for 48 hours at 56°C, with constant agitation. Then, two consecutive steps of purification were applied, phenol:chloroform: isoamyl alcohol (25:24:1) and the Wizard SV Gel and PCR Clean-Up System (Promega). PCR amplification was performed in a 20 µL final volume, containing 2–4 µL aDNA extracts, with specific primers for *Taenia cyt* b: Tae32F ATATGGCTCGTGCTTTGTATTATTC and Tae32R AGGTAATATATATCCWGTAAAAGCCTC (Côté et al. 2016). PCR products were separated by 8% acrylamide:bisacrylamide (19:1) native gel electrophoresis and visualized in an UV transilluminator. Amplicons were sent to Macrogen (Seoul, Korea) for Sanger sequencing of both DNA chains. Electropherograms were analyzed with the Snapgene Viewer 5.1 software. Measures to avoid contamination with modern material and PCR products were taken following Ramirez, Saka, and Nores (2021).

Results

Paleoparasitological analysis by light microscopy allowed the identification of parasite eggs (Figure 3) and a larva. We found 10 lemon-shaped structures of brown color coincident with *Trichuris* sp. eggs, only one with polar plugs conserved, in the samples belonging to contexts 356 and 414 (Figure 3a). Seven taeniid eggs with thick-striated walls were identified in samples 306a, 306b, and 356 (Figure 3b). Sixteen structures suggestive of *Ascaris lumbricoides* eggs were found in all samples. They were ovoid shaped and yellow to brown colored, both with and without its characteristic mammillated coat (Figure 3c). The number of eggs observed, epg estimates, and measures are shown in Table 2. In addition, we observed a larva in sample 306b, similar to a free-living nematode larva. All external controls were negative, thus discarding the possibility of environmental contamination. The two methods used for the paleoparasitological examination yielded different results, with the hydrochloric acid technique generally enabling a higher egg recovery.

With regard to the paleogenetic analysis, successful PCR amplification of an expected 113 bp fragment with the specific *cyt* b primers for *Taenia* sp. was obtained from the 356 aDNA extract. However, we could not obtain the sequence of this fragment to confirm the genus determination. External samples, PCR negative controls, and extraction blanks were negative by PCR.

Discussion

We analyzed sediments from two trash pits and a cesspool collected during an archaeological assessment in the historic downtown of Córdoba. Using light microscopy, we recognized parasite eggs of whipworm (*Trichuris* sp.), possible roundworm (*A. lumbricoides*), and tapeworm with two concentration techniques. However, disaggregation with hydrochloric acid yielded more eggs than spontaneous sedimentation (Table 2), highlighting the usefulness of trying more than one method with certain kind of samples. This difference could be due to the presence of calcium carbonates, that bind parasite eggs to the soil matrix, which are subsequently released when hydrochloric acid dissolves this salt (Reinhard et al. 1986, 2008; Romera Barbera et al. 2020; Warnock and Reinhard 1992).

Because *Taenia* and *Echinococcus* tapeworm eggs are indistinguishable by morphometric and morphological characteristics, we performed PCR with specific *Taenia cyt* b primers to determine the genus (Côté et al. 2016). Although one fragment with the expected size was amplified, we failed to obtain a DNA sequence, so that we cannot, with certainty, assign the tapeworm eggs to a genus. In the site, animal bones of

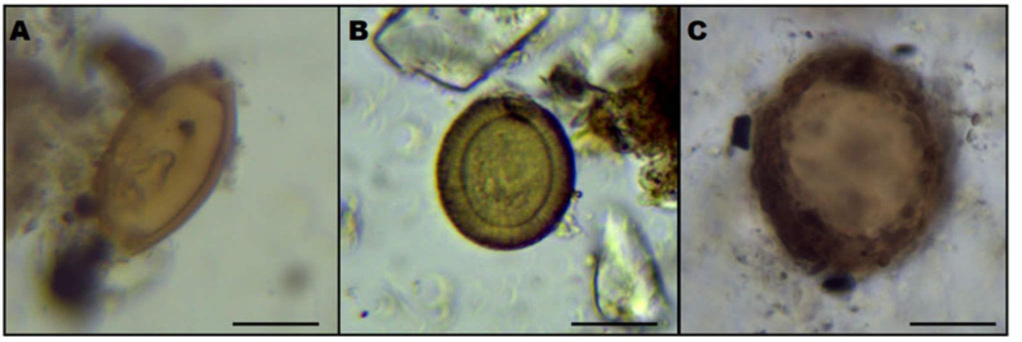

Figure 3. Paleoparasitological findings by light microscopy: (a) *Trichuris* sp. egg, (b) Taeniid egg, and (c) possible *A. lumbricoides* egg. Bar = 20 µm.

ungulates were found together with bird and fish remains during the excavation, but a full zooarchaeological analysis has not been done yet, and we can only ascertain that cow bones (*Bos taurus*) were present in these contexts (María Marschoff, personal communication 2020). However, the predominant consumption of beef during the nineteenth century in the city, as opposed to pork, sheep, and other animals (Izeta et al. 2014; Remedi 2004), allows us to suggest that the eggs belong to *T. saginata* (beef tapeworm). Yet, we cannot rule out the presence of other species of the genera *Taenia* or *Echinococcus,* as *T. solium* and *E. granulosus*. As for the possible roundworm eggs, *A. lumbricoides* and *A. suum* were traditionally differentiated for humans and pigs, respectively, although cross-infection cases with these helminths were occasionally reported. Advances in molecular techniques allow us to state that they are actually the same species, proposed to be named as *A. lumbricoides* (Leles et al. 2012). Concerning whipworm, species differentiation by morphometric means is usually possible, even between *Trichuris trichiura*, the human whipworm, and *T. suis*, the pig one, which have similar sizes. According to the dimensions of the observed whipworm eggs (Table 2), they fall within the expected range for *T. trichiura* (Confalonieri et al. 1985). Nevertheless, overlapping of the sizes can occur (Nejsum et al. 2012), so whipworm eggs could also belong to *T. suis* or both species could occur simultaneously (Maicher et al. 2017).

Previous paleoparasitological studies in Argentina allowed the identification of a wide

Table 2. Paleoparasitological Findings by Light Microscopy, Reporting Observed Eggs (*n*) and Eggs per Gram (epg) Estimates Using Both Techniques.

Parasite	Sample	Interpretation	epg by HCl (*n* observed)	epg by Lutz (*n* observed)	Length (µm)	Wide (µm)
Taeniid	306a	Cesspool	—	5 (1)	33.25–41.12	28.45–32.30
	306b	Cesspool	40 (4)	—	(Mean: 35.62)	(Mean: 30.50)
	356	Trash pit	10 (1)	5 (1)		
	414	Trash pit	—	—		
Trichuris sp.	306a	Cesspool	—	—	47.05–50.84	24.36–27.65
	306b	Cesspool	—	—	(Mean: 48.11)	(Mean: 25.33)
	356	Trash pit	80 (8)	5 (1)		
	414	Trash pit	—	5 (1)		
Possible *Ascaris lumbricoides*	306a	Cesspool	10 (1)	10 (2)	39.15–67.80	29.45–55.10
	306b	Cesspool	10 (1)	—	(Mean: 52.44)	(Mean: 43.12)
	356	Trash pit	30 (3)	10 (2)		
	414	Trash pit	110 (11)	30 (6)		

Notes: HCl: hydrochloric acid disaggregation; Lutz: spontaneous sedimentation.

https://doi.org/10.1017/laq.2021.68 Published online by Cambridge University Press

range of parasite species; most were conducted in Patagonia (Beltrame et al. 2010, 2017, 2020; Fugassa 2014; Fugassa and Barberena 2006; Fugassa and Dubois 2009), with few studies carried out in other regions (Aranda and Araújo 2018; Petrigh et al. 2019), including Córdoba Province (Ramirez, Vieira de Souza, et al. 2021). Most of these findings are dated from the Pleistocene–Holocene transition to the late Holocene, and only a few are from postcontact moments (Fugassa 2006; Fugassa et al. 2006). Studies related to these later contexts in South America are scarce and limited to the colonial period of the city of Rio de Janeiro (Guedes et al. 2020; Jaeger and Iñiguez 2014; Jaeger, Taglioretti, Dias, et al. 2013; Jaeger, Taglioretti, Fugassa, et al. 2013).

Ours is the first study to conduct paleoparasitological research in Argentina on urban-historical samples. Although parasite diversity in Argentinian prehispanic populations has been mainly characterized to determine the presence of animal parasites, including some with zoonotic importance, our results from nineteenth-century contexts account for the presence of human-specific parasites, which highlight the consequences that urbanization, industrialization, and other processes have on the sanitary conditions of human populations (Mitchell 2015; Reinhard et al. 2013).

Whipworms and roundworms are considered geohelminths: parasites that must pass through the soil under specific temperature and humidity conditions to complete their biological cycle (Muller 2002). Their cycles differ somewhat after the eggs are expulsed to the environment by the gravid female, but both have fecal–oral transmission, usually by eating food or drinking water polluted with fecal matter or by handling food with contaminated hands (Acha and Szyfres 2003). Co-infection with these nematodes occurs frequently in current populations (Muller 2002) and has been reported in archaeological and historical cases (Gonçalves et al. 2003; Mitchell 2015). Beef/pork tapeworms are not geohelminths and have humans as definitive hosts and cattle and pig as intermediate hosts. Humans become infected when eating raw or undercooked meat of infected animals (Muller 2002). Some *Echinococcus* species have dog and cats, among other animals, as definitive hosts, and humans are accidental hosts when they have close contact with feces containing eggs (Atías 1998). Beef/pork tapeworms have been reported in many works of the Old World paleoparasitological literature (Côté et al. 2016; Gonçalves et al. 2003; Mitchell 2015), whereas there are few findings in the New World (Jaeger, Taglioretti, Fugassa, et al. 2013). *Echinococcus* sp. findings have been reported in both the New and the Old World, but mainly as taeniids, except when molecular confirmation of the genera was achieved (Côté et al. 2016; Gonçalves et al. 2003; Paknezhad et al. 2017; Reinhard 1990; Wilke and Hall 1975). Oviposition of these helminths differs importantly. *Trichuris* females can lay up to 20,000 eggs per day, whereas *A. lumbricoides* can lay up to 200,000 eggs daily. *T. saginata* produces about 100,000 eggs daily by releasing mature proglotids, the segments that form the worm body, whereas *T. solium* lays about 40,000 per day (Acha and Szyfres 2003). *Echinococcus* oviposition may vary among species, but between 500 and 1,500 eggs per day are usually laid by the gravid female (Atías 1998). The low number of parasites recovered in each sample could be either suggestive of low parasite burdens or a result of postdepositional events.

In this sense, taphonomic processes affect both the amount and the structure of the parasite remains. The percolation caused by water flow and the presence in the soils of decomposer agents like fungi and bacteria might have hampered good preservation of the eggs (Camacho et al. 2013, 2016; Fugassa 2014; Jaeger, Taglioretti, Fugassa, et al. 2013; Morrow et al. 2016). Furthermore, parasite species are affected in different ways by the action of taphonomic processes. Thus, for example, ascarid eggs have multiple thick layers that give them a more resistant structure than other nematodes, allowing them to be preserved over time (Rácz et al. 2015; Romera Barbera et al. 2020). However, this preservation depends not only on the inherent characteristics of each parasite species but also on the environmental conditions of the archaeological site (Morrow et al. 2016; Rácz et al. 2015).

The effects of these parasites on human health depend mainly on the parasite burden, as well as on particular host conditions that make them more susceptible to disease. Usually, the infections of *A. lumbricoides*, *T. trichiura*, *Taenia* sp., and *Echinoccocus* sp. remain asymptomatic if the load is low. When the burden is heavier, abdominal discomfort, diarrhea, weight loss, and anemia occur, and children can suffer stunting and malnutrition in certain cases (Acha and Szyfres 2003; Muller 2002). Specific symptoms of each parasitosis appear in extreme cases (Acha and Szyfres 2003; Muller 2002; Satoskar et al. 2009).

Poor health and food hygiene conditions were documented in Córdoba in the period studied here. Toward the end of the nineteenth century and the beginning of the twentieth century, 40%–50% of deaths were due to infectious diseases (Carbonetti 2005; Carbonetti and Boixadós 2002). In 1926, for example, 176 out of 1,000 deaths in Córdoba Province were caused by digestive disorders, from which 142 were diarrhea-enteritis cases. In addition, 136 of these 142 deaths were of children between birth and two years old. More than one-third of the deaths in children under that age were due to gastrointestinal diseases, with poor hygiene as the main cause (Remedi 2004). Documents also show that the operation of slaughterhouses in the city was regulated toward the end of the nineteenth century, but hygienic conditions were still not optimal (Remedi 2004). For several decades, animals were slaughtered in establishments that were not properly sanitized. Meat was loaded into open carts, where they were exposed to the sun and dust until they reached the market and then offered for sale for approximately two days (Remedi 2004). In addition, because of the rudimentary technology of the time, families and commercial premises were not used to conserving meat in cold storage, which also posed a sanitation risk. Freezing meats is now known to be a reliable way to kill some taeniid cysticerci, the infective state of these parasites (Okello and Thomas 2017).

Considering this context, it would be expected that people who used the premises on San Jerónimo Street may have suffered health problems related to the sanitary conditions prevailing at that time. *A. lumbricoides*, *Trichuris* sp., and *Taenia* sp. eggs attest to the circulation of these parasites between those living or working there, because eggs of these species are exclusively released by infected humans with their fecal matter. However, the possible presence of taeniid eggs belonging to the genera *Echinococcus* could also be related to the dispersion of animal feces in the spaces that people inhabited or the disposal of animal excreta in the structures used as cesspool and trash pits. Handwashing has been shown to reduce the transmission of pathogens, including parasites; the washing of meats and vegetables and the consumption of clean water have been found to be critically important as well (Mitchell 2015). The water supply in the city of Córdoba came from different sources—from ditches and water gutters to pools in the central square—following the population as it grew. By the end of the nineteenth century, water pollution, especially with fecal matter, was a major concern among authorities, who were aware of the presence of waterborne pathogens and its relationship with mortality rates in the city (Solveira 2009). Thus, it is possible that the washing of food and kitchenware with polluted water, the inefficient washing of hands, and a general lack of cleanliness were closely related with the incidence of roundworms and whipworms.

The presence of beef/pork tapeworms in contexts 306 and 356 would indicate the consumption of animals infected with these parasites. Given that proper cooking of these meals would have killed cysticerci present in the meat, insufficient cooking is suggested, as largely suggested in the paleoparasitological record (Hald et al. 2018; Mitchell 2015; Reinhard et al. 2013).

The creation of systems and structures for urine and fecal matter disposal, such as cesspools and latrines, is critically important to reducing infectious disease dispersion (Mitchell 2015). Nevertheless, the inadequate management of night soils—the human excreta contained in these structures—and the pollution of water and food supplies continued to be a problem. Thus, it is not surprising that in a city like late nineteenth-century Córdoba, parasitosis was still a health risk in spite of having cesspools and sewage drainage systems. According to historical documents, the waters of local rivers were polluted, as were the water wells due to leaks from nearby latrines: thus citizens had to choose between two unhealthy options for their water supply (Remedi 2004; Solveira 2009). In 1909, the first national sanitation plan was drawn up, and in 1912, a state company called Obras de Salubridad de la Nación (Sanitary Works of the Nation) was established. Its aim was the study, construction, and administration of facilities to provide drinking water for domestic use in cities and towns of the country. Historical documents from Córdoba city indicate that these sanitary facilities were installed in the beginning of the twentieth century in all the buildings on San Jerónimo Street (Archivo Histórico Municipal 1909). It is highly likely that these facilities improved sanitary conditions for the residents of the city.

Conclusions

In this work, we found remains of whipworm, possible roundworm, and tapeworm, which provides evidence that people inhabiting and working in these premises were exposed to parasitic infections. These results suggest that the growth of urban populations, deficient food preparation, and poor hygiene practices were closely related to the occurrence of these food- and fecal-borne parasites. Previous paleoparasitological research in South America has focused mainly on samples from precontact archaeological sites; our study encourages new investigations related to parasitic incidence in local urban-historical contexts. We consider that new studies must be done to deepen our knowledge on the relation between cultural practices and parasite infections in urban contexts in the past, as well as to obtain a broader insight of which species circulated among the past populations of the central region of Argentina.

Acknowledgments. We would like to thank the archaeologists, students, and construction workers who executed the archaeological assessment at the San Jerónimo site—Soledad Galimberti, Virginia Gabriel, Oscar Vives, Lucas D'Agostino, and Mailén Aguirre, and especially María Marschoff (Instituto de Humanidades, CONICET—UNC), who directed the assessment—for generously providing the sediment samples and for a critical review of the manuscript. We also thank the reviewers whose comments helped improve this article. There are no conflicts of interest regarding the financing of this research or the writing of this article. No permits were required for the present work. The laboratory work was supported by the Ministerio de Ciencia y Tecnología de la Provincia de Córdoba (PID 2018-79). The archaeological assessment was supported by the Fideicomiso Fundación San Roque (Córdoba, Argentina). DAR is a doctoral fellow, and HBL and RN are Research Career members of the National Scientific and Technical Research Council (CONICET), Argentina.

Data Availability Statement. All data resulting from this research are within this article and in the supplemental materials.

Supplemental Material. For supplemental material accompanying this article, visit https://doi.org/10.1017/laq.2021.68.

Supplemental Table 1. Characteristics, Inclusions, and Interpretation of the Relevant Contexts Associated with the Three Contexts Sampled for Paleoparasitological Analyses.

References Cited

Acha, Pedro, and Boris Szyfres
2003 *Zoonoses and Communicable Diseases Common to Man and Animals: Parasitoses*. Pan American Health Organization, Washington, DC.

Anastasiou, Evilena, and Piers D. Mitchell
2013 Palaeopathology and Genes: Investigating the Genetics of Infectious Diseases in Excavated Human Skeletal Remains and Mummies from Past Populations. *Gene* 528:33–40.

Aranda, Claudia M., and Adauto Araújo
2018 Estudio paleoparasitológico en el sitio Chenque I. In *El sitio Chenque I: Un cementerio prehispánico en la Pampa Occidental: Estilo de vida e interacciones culturales de cazadores-recolectores del Cono Sur Americano*, edited by Mónica Berón, pp. 327–340. Sociedad Argentina de Antropología, Buenos Aires.

Araújo, Adauto, Karl Reinhard, Luiz F. Ferreira, Elisa Pucu, and Pedro P. Chieffi
2013 Paleoparasitology: The Origin of Human Parasites. *Arquivos de Neuro-Psiquiatria* 71:722–726.

Archivo Histórico Municipal
1909 *Obras de salubridad de la Nación: Expedientes 1304, 1305 y 1306*. Archivo Histórico Municipal, Córdoba, Argentina.

Atías, Antonio
1998 *Parasitología médica*. Editorial Mediterráneo, Santiago.

Beltrame, María O., Martín H. Fugassa, and Norma H. Sardella
2010 First Paleoparasitological Results from Late Holocene in Patagonian Coprolites. *Journal of Parasitology* 96:648–651.

Beltrame, María O., Cesar Pruzzo, Rodrigo Sanabria, Alberto Pérez, and Matías S. Mora
2020 First Report of Pre-Hispanic *Fasciola hepatica* from South America Revealed by Ancient DNA. *Parasitology* 147:371–375.

Beltrame, María O., Eleonor Tietze, Alberto E. Pérez, Agustín Bellusci, and Norma H. Sardella
2017 Ancient Parasites from Endemic Deer from "Cueva Parque Diana" Archeological Site, Patagonia, Argentina. *Parasitology Research* 116:1523–1531.

Berberián, Eduardo E., Diego Rivero, Sebastián Pastor, Julián Salazar, Valeria Franco Salvi, Laura López, Guillermo Heider, Cecilia Berberián, and Sol García
2008 Arqueología histórica (colonial temprana hasta la actualidad) en el predio del Colegio de Escribanos de Córdoba. *Revista Notarial* 90:331–357.
Brizuela, Camila F., and Julián Mignino
2020 Evaluaciones de impacto arqueológico en el centro de la ciudad de Córdoba, Argentina. El caso de Ituzaingó 249. *La Zaranda de Ideas* 17(2):66–84.
Callen, Eric O., and T. W. M Cameron
1960 A Prehistoric Diet Revealed in Coprolites. *New Scientist* 8:35–40.
Camacho, Morgana, Daniela Leles, Juliana Dutra Santiago, Renato Rodriguez Cabral Ramos, Claudia Uchôa, Otilio Machado Pereira Bastos, Victor Hugo Borba Nunes, et al.
2016 Investigation of Biodegradation in Three Different Sediment Cores from a Shellmound (Sambaqui) of Brazil, Using *Ascaris lumbricoides* Eggs as a Model. *Journal of Archaeological Science: Reports* 9:358–365.
Camacho, Morgana, Thaíla Pessanha, Daniela Leles, Juliana M. F. Dutra, Rosângela Silva, Sheila Mendonça de Souza, and Adauto Araújo
2013 Lutz's Spontaneous Sedimentation Technique and the Paleoparasitological Analysis of Sambaqui (Shell Mound) Sediments. *Memorias do Instituto Oswaldo Cruz* 108:155–159.
Carbonetti, Adrián
2005 La conformación del sistema sanitario de la Argentina: El caso de la Provincia de Córdoba, 1880–1926. *Dynamis: Acta Hispanica ad Medicinae Scientiarumque: Historiam Illustrandam* 25:87–116.
Carbonetti, Adrián, and Cristina Boixadós
2002 Problemas de salud y enfermedad en el discurso médico estatal en la ciudad de Córdoba a fines del siglo XIX. *Anuario de la Escuela de Historia* 2:99–117.
Confalonieri, Ulisses E., Benjamim M. Ribeiro-Filho, Luiz F. Ferreira, and Adauto Araújo
1985 The Experimental Approach to Paleoparasitology: Desiccation of *Trichuris trichiura* eggs. *Paleopathology Newsletter* 51:9–11.
Côté, Nathalie M. L., Julien Daligault, Mélanie Pruvost, E. Andrew Bennett, Olivier Gorgé, Silvia Guimaraes, Nicolas Capelli, et al.
2016 A New High-Throughput Approach to Genotype Ancient Human Gastrointestinal Parasites. *PLoS ONE* 11(1):e0146230.
Fugassa, Martín H.
2006 Examen paleoparasitológico de sedimentos de un sitio arqueológico, Río Mayo, Chubut, Argentina. *Parasitologia Latinoamericana* 61:172–175.
2014 Paleoparasitological Diagnosis. In *Foundations of Paleoparasitology*, edited by Luiz F. Ferreira, Karl J. Reinhard, and Adauto Araújo, pp. 223–254. Editora Fiocruz, Río de Janeiro.
Fugassa, Martín H., Adauto Araújo, and Ricardo A. Guichón
2006 Quantitative Paleoparasitology Applied to Archaeological Sediments. *Memorias do Instituto Oswaldo Cruz* 101(suppl. 2):29–33.
Fugassa, Martín H., and Ramiro Barberena
2006 Cuevas y zoonosis antiguas: Paleoparasitología del sitio Orejas de Burro 1 (Santa Cruz, Argentina). *Magallania* 34(2):57–62.
Fugassa, Martín H., and Favier C. Dubois
2009 Primer registro paleoparasitológico de *Trichuris* sp. (Nematoda, Capilariidae) en muestras asociadas a restos humanos del Holoceno tardío de Patagonia septentrional. *Revista Argentina de Antropología Biológica* 11:61–71.
Gabriel, Virginia
2020 Patrimonios en conflicto: procesos y prácticas de patrimonialización en la ciudad de Córdoba. Licentiate thesis, Departamento de Antropología, Universidad Nacional de Córdoba, Córdoba, Argentina.
Gonçalves, Marcelo L. C., Adauto Araújo, and Luiz F. Ferreira
2003 Human Intestinal Parasites in the Past: New Findings and a Review. *Memorias do Instituto Oswaldo Cruz* 98 (suppl. 1):103–118.
Guedes, Lucélia, Victor H. Borba, Morgana Camacho, Jandira Neto, Ondemar Dias, and Alena Mayo Iñiguez
2020 African Helminth Infection out of Africa: Paleoparasitological and Paleogenetic Investigations in Pretos Novos Cemetery, Rio de Janeiro, Brazil (1769–1830). *Acta Tropica* 205:105399.
Hald, Mette M., Jacob Mosekilde, Betina Magnussen, Martin Jensen Søe, Camilla H. Hansen, and Morten F. Mortensen
2018 Tales from the Barrels: Results from a Multi-Proxy Analysis of a Latrine from Renaissance Copenhagen, Denmark. *Journal of Archaeological Science: Reports* 20:602–610.
Harris, Edward C.
1989 *Principles of Archaeological Stratigraphy*. 2nd ed. Academic Press, London.
Izeta, Andrés D., Eduardo A. Pautassi, G. Roxana Cattáneo, Andrés I. Robledo, José M. Caminoa, Julián Mignino, and Isabel Prado
2017 *Arqueología urbana en el área central de la Ciudad de Córdoba, Argentina: Excavaciones en la Sede Corporativa del Banco de la Provincia de Córdoba (2014–2016)*. South American Archaeological Series 29. Archaeopress, Oxford.
Izeta, Andrés D., Eduardo Pautassi, Thiago Costa da Silva, Andrés Robledo, and Cristian Bilinski
2014 Excavaciones arqueológicas en el área fundacional de la ciudad de Córdoba, Argentina. Dean Funes 67. *Revista de Arqueología Histórica Argentina y Latinoamericana* 8(1):45–69.
Jaeger, Lauren H., and Alena Mayo Iñiguez
2014 Molecular Paleoparasitological Hybridization Approach as Effective Tool for Diagnosing Human Intestinal Parasites from Scarce Archaeological Remains. *PLoS ONE* 9(8):e105910.
Jaeger, Lauren H., Veronica Taglioretti, Ondemar Dias, and Alena Mayo Iñiguez
2013 Paleoparasitological Analysis of Human Remains from a European Cemetery of the 17th–19th Century in Rio de Janeiro, Brazil. *International Journal of Paleopathology* 3:214–217.
Jaeger, Lauren H., Veronica Taglioretti, Martín H. Fugassa, Ondemar Dias, Jandira Neto, and Alena Mayo Iñiguez
2013 Paleoparasitological Results from XVIII Century Human Remains from Rio de Janeiro, Brazil. *Acta Tropica* 125:282–286.
Leles, Daniela, Scott L. Gardner, Karl J. Reinhard, Alena Mayo Iñiguez, and Adauto Araújo
2012 Are *Ascaris lumbricoides* and *Ascaris suum* a Single Species? *Parasites and Vectors* 5(1):42.
Lindskoug, Henrik B., María Marschoff, and Virginia Gabriel
2019 Reflexiones acerca de la arqueología de contrato y prácticas de patrimonialización en la ciudad de Córdoba, Argentina. In *Libro de resúmenes del XX Congreso*

Nacional de Arqueología Argentina: 50 Años de Arqueologías, edited by Gustavo A. Laguens, Mirta Bonnin, M. Bernarda Marconetto, and Thiago Costa da Silva, pp. 1631–1633. Facultad de Filosofía y Humanidades, Universidad Nacional de Córdoba, Córdoba, Argentina.

Lindskoug, Henrik B., Francisco Pazarelli, Andrés G. Laguens, Andrés D. Izeta, and José B. Hierling
2011 Vestigios de la despensa jesuita: Rastreando las instalaciones jesuíticas de la primera Universidad de Córdoba. In *Temas y problemas de la Arqueología Histórica, Tomo II*, edited by Mariano Ramos, Alicia Tapia, Fabián Bognanni, Mabel Fernández, Verónica Helfer, Carlos Landa, Matilde Lanza, et al., pp. 329–340. Programa de Arqueología Histórica y Estudios Pluridisciplinarios, Departamento de Ciencias Sociales, Universidad Nacional de Luján, Luján, Argentina.

Lindskoug, Henrik B., Oscar Vives, and Lucas D'Agostino
2019 Mapeo en contextos arqueológicos urbanos: registro estratigráfico y representaciones cartográficas en la ciudad de Córdoba. In *Libro de resúmenes del XX Congreso Nacional de Arqueología Argentina: 50 Años de Arqueologías*, edited by Andrés G. Laguens, Mirta Bonnin, M. Bernarda Marconetto, and Thiago Costa da Silva, pp. 534–536. Facultad de Filosofía y Humanidades, Universidad Nacional de Córdoba, Córdoba, Argentina.

Luque Colombres, Carlos A.
1980 *Orígenes históricos de la propiedad urbana de Córdoba (siglos XVI y XVII)*. Facultad de Filosofía y Humanidades, Universidad Nacional de Córdoba, Córdoba, Argentina.

Lutz, Adolpho
1919 O *Schistosomum mansoni* e a *Schistosomatose segundo* observações, feitas no Brazil. *Memórias do Instituto Oswaldo Cruz* 11:121–155.

Maicher, Céline, Alizé Hoffmann, Nathalie M. L. Côté, Antoni Palomo Pérez, Maria Saña Segui, and Matthieu Le Bailly
2017 Paleoparasitological Investigations on the Neolithic Lakeside Settlement of La Draga (Lake Banyoles, Spain). *Holocene* 27:1659–1668.

Marschoff, María, and Henrik B. Lindskoug
2020 Use of Historical Sources and Excavation and Registration Techniques in a Case of Urban Archaeology in Cordoba, Argentina. *Arqueologia Iberoamericana* 45:43–54.

Marschoff, María, Henrik B. Lindskoug, M. Soledad Galimberti, Oscar Vives, Lucas D'Agostino, Virginia Gabriel, and Mailén Aguirre
2017 *Proyecto de investigación e intervención arqueológica: Calle San Jerónimo N° 344/360 B° Centro, Ciudad de Córdoba*. Final report submitted to the Agencia Córdoba Cultura and the Municipalidad de la Ciudad de Córdoba.
2018 Arqueología de contrato en la ciudad de Córdoba. Posibilidades y limitaciones. In *Libro de resúmenes extendidos del VII Congreso Nacional de Arqueometría*, pp. 285–288. Universidad Nacional de Tucumán, Argentina.

Marschoff, María, Henrik B. Lindskoug, and Oscar Vives
2018 *Proyecto de investigación e intervención arqueológica, calle San Jerónimo n.º 326, 344, 360, Barrio Centro, Ciudad de Córdoba: Informe de etapa de control de obra. Fideicomiso Fundación San Roque III*. Work control stage report submitted to the Fideicomiso Fundación San Roque III, Córdoba.

Mitchell, Piers D.
2015 *Sanitation, Latrines and Intestinal Parasites in Past Populations*. Ashgate, Surrey, UK.

Mitchell, Piers D., Evilena Anastasiou, and Danny Syon
2011 Human Intestinal Parasites in Crusader Acre: Evidence for Migration with Disease in the Medieval Period. *International Journal of Paleopathology* 1:132–137.

Morrow, Johnica J., Jessa Newby, Dario Piombino-Mascali, and Karl J. Reinhard
2016 Taphonomic Considerations for the Analysis of Parasites in Archaeological Materials. *International Journal of Paleopathology* 13:56–64.

Muller, Ralph D.
2002 *Worms and Human Disease*. CABI, Wallingford, UK.

Municipalidad de Córdoba
2011 *Ordenanza Municipal 11.935*. Municipalidad de Córdoba, Córdoba, Argentina.

Nejsum, Peter, Martha Betson, Richard P. Bendall, Stig M. Thamsborg, and J. Russell Stothard
2012 Assessing the Zoonotic Potential of *Ascaris suum* and *Trichuris suis*: Looking to the Future from an Analysis of the Past. *Journal of Helminthology* 86:148–155.

Okello, Anna L., and Lian F. Thomas
2017 Human Taeniasis: Current Insights into Prevention and Management Strategies in Endemic Countries. *Risk Management and Healthcare Policy* 10:107–116.

Paknezhad, Niloofar, Farbod Haji Mazdarani, Morteza Hessari, Iraj Mobedi, Faezeh Najafi, Negar Bizhani, Mahsasadat Makki, et al.
2017 Retrieving Ascarid and Taeniid Eggs from the Biological Remains of a Neolithic Dog from the Late 9th Millennium BC in Western Iran. *Memorias do Instituto Oswaldo Cruz* 112:593–595.

Petrigh, Romina S., Jorge G. Martínez, Mariana Mondini, and Martín H. Fugassa
2019 Ancient Parasitic DNA Reveals *Toxascaris leonina* Presence in Final Pleistocene of South America. *Parasitology* 146:1284–1288.

Rácz, S. Elizabeth, Elisa Pucu De Araújo, Ethan Jensen, Carmen Mostek, Johonica J. Morrow, Marie-Laure Van Hove, Raffaella Bianucci, et al.
2015 Parasitology in an Archaeological Context: Analysis of Medieval Burials in Nivelles, Belgium. *Journal of Archaeological Science* 53:304–315.

Ramirez, Darío A., Héctor A. Saka, and Rodrigo Nores
2021 Detection of Vibrio cholerae aDNA in Human Burials from the Fifth Cholera Pandemic in Argentina (1886–1887 AD). *International Journal of Paleopathology* 32:74–79.

Ramirez, Darío A., Mônica Vieira de Souza, Alena Mayo Iñiguez, and Mariana Fabra
2021 Primer estudio paleoparasitológico en restos humanos de la provincia de Córdoba (Holoceno tardío). *Revista Argentina de Antropología Biológica* 23(1):030.

Reinhard, Karl J.
1989 Parasitological Analyses of Latrine Soils from the Boott Mills Boarding House Site, Lowell, Massachusetts. In *Interdisciplinary Investigations of the Boott Mill, Lowell, Massachusetts: Vol. 3, The Boarding House System as a Way of Life*, edited by Mary C. Beaudry and Stephen A. Mrozowski, pp. 271–272. Cultural Resources Management Study 21. Division of Cultural Resources, North Atlantic Regional Office, National Park Service, Boston.

1990 Archaeoparasitology in North America. *American Journal of Physical Anthropology* 82:145–163.

Reinhard, Karl J., Adauto Araújo, Luciana Sianto, Julia G. Costello, and Karen Swope
2008 Chinese Liver Flukes in Latrine Sediments from Wong Nim's Property, San Bernardino, California: Archaeoparasitology of the Caltrans District Headquarters. *Journal of Parasitology* 94:300–303.

Reinhard, Karl J., Ulisses Confalonieri, Bernd Herrmann, Luiz F. Ferreira, and Adauto Araújo
1986 Recovery of Parasite Remains from Coprolites and Latrines: Aspects of Paleoparasitological Technique. *Homo* 37:217–239.

Reinhard, Karl J., Luiz F. Ferreira, F. Bouchet, Luciana Sianto, Juliana M. F. Dutra, Alena Iñiguez, Daniela Leles, et al.
2013 Food, Parasites, and Epidemiological Transitions: A Broad Perspective. *International Journal of Paleopathology* 3:150–157.

Remedi, Fernando J.
2004 El consumo alimentario en la Provincia de Córdoba 1870–1930. PhD dissertation, Facultad de Filosofía y Humanidades, Universidad Católica de Córdoba, Córdoba, Argentina.

Romera Barbera, Aida, Darwin Hertzel, and Karl J. Reinhard
2020 Attempting to Simplify Methods in Parasitology of Archaeological Sediments: An Examination of Taphonomic Aspects. *Journal of Archaeological Science: Reports* 33:1–8.

Satoskar, Abhay R., Gary L. Simon, Peter J. Hotez, and Moriya Tsuji
2009 *Medical Parasitology*. Landes Bioscience, Austin, Texas.

Seo, Min, Jong Yil Chai, Myeung Ju Kim, Sang Yuk Shim, Ho Chul Ki, and Dong Hoon Shin
2016 Detection Trend of Helminth Eggs in the Strata Soil Samples from Ancient Historic Places of Korea. *Korean Journal of Parasitology* 54:555–563.

Solveira, Beatriz R.
2009 El Servicio de agua corriente en la ciudad de Córdoba, Argentina, 1880–1935. *Agricultura, Sociedad y Desarrollo* 6:253–276.

Trigg, Heather B., Susan A. Jacobucci, Stephen A. Mrozowski, and John M. Steinberg
2017 Archaeological Parasites as Indicators of Environmental Change in Urbanizing Landscapes: Implications for Health and Social Status. *American Antiquity* 82:517–535.

Warnock, Peter J., and Karl J. Reinhard
1992 Methods for Extracting Pollen and Parasite Eggs from Latrine Soils. *Journal of Archaeological Science* 19:261–264.

Westman, Andrew (editor)
1994 *Archaeological Site Manual*. 3rd ed. Museum of London, London.

Wilke, Philip J., and Henry J. Hall
1975 *Analysis of Ancient Feces: A Discussion and Annotated Bibliography*. Archaeological Research Facility, University of California, Berkeley.

Yeh, Hui Yuan, Chieh Fu Jeff Cheng, Chingjung Huang, Xiaoya Zhan, Weng Kin Wong, and Piers D. Mitchell
2019 Discovery of *Eurytrema* Eggs in Sediment from a Colonial Period Latrine in Taiwan. *Korean Journal of Parasitology* 57:595–599.

Submitted December 2, 2020; Revised March 23, 2021; Accepted July 11, 2021