RECENT WORK ON THE CAVES OF TRINIDAD AND TOBAGO

NOVEJŠE PREUČEVANJE JAM NA TRINIDADU IN TOBAGU

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Izvleček

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Darlington, Johanna P. E. C.: Novejše preučevanje jam na Trinidadu in Tobagu

Večina danes znanih jam na Trinidadu in Tobagu je bila odkritih do 1950, raziskane pa so bile predvsem v zadnjih treh desetletjih. Zaradi izbruha stekline je bila posebna pozornost posvečena preučevanju netopirjev, v zvezi z njimi pa tudi podzemeljskim jamam. V šestdesetih letih se je pojavilo vprašanje histoplasmose tudi v trinidadskih jamah. Po 1960 pa so pričenjali preučevati ptice tolstičnike (guacharo) iz znanstvenih in naravovarstvenih nagibov, kar je vzpodbudilo raziskave jam, med drugimi tudi deset let trajajočo ekološko študijo jamskega spleta Tamana.

Ključne besede: speleologija, regionalne raziskave, netopirji, histoplasmosa, tolstičnik, zgodovina raziskav; Amerika, Zahodna Indija, Trinidad in Tobago

Abstract

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By 1950 most of the Trinidad caves known today had already been discovered but the majority was explored in the last three decades. Due to an outbreak of paralytic rabies special atention was given to bats and thus, consequently, to cave exploration. In the 60s the problem of histoplasmosis appeared in the caves of Trinidad too. After 1960 the study of guacharos started mostly from scientific and natural conservation point of view arousing an interest for cave exploration, among others ten years lasting ecological study of Tamana cave system.

Key words: speleology, regional researches, bats, histoplasmosis, guacharo, history of explorations; America, West Indies, Trinidad and Tobago.

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INTRODUCTION

By 1950 most of the Trinidad caves known today had already been discovered. The process of exploration was far from continuous. Indeed a number of quite well-documented caves have become lost, as their locations have been forgotten.

No systematic list has ever been published. Pawson, a sport caver stationed at Piarco Airport in 1945-46, wrote descriptions of all the caves known to him, but his draft was never published in full (two short excerpts were published in 1974). Komisarcik (1979) made an independent attempt to list the better known caves, reaching a total of 21. This is far fewer than were listed by de Verteuil and Urich (1936) for one small part of the island, but they were counting any activity that contained a bat roost, whereas Komisarcik only included caves large enough for people to enter.

CAVE SURVEY AND EXPLORATION

In 1974 a student from the Jamaica campus of UWI was employed by the Ministry of Planning in Trinidad to survey the caves in the Lopinot Valley with a view to developing them for tourism. His report (Aquing 1974) included brief descriptions and good maps with sketch sections of all the five known caves. This is certainly the best survey so far published of any Trinidad caves, but is not readily available.

In 1978 four members of the Bloomington, Indiana Grotto of the National Speleological Society mounted their own small expedition to Trinidad (Komisarcik 1979; Wright 1979). They visited and made rough surveys of the Oropouche Cave, Caura Cave and the Tamana Caves, and drew up a list of other reputed caves in the island, but without quoting their sources (Komisarcik 1979). This was a very worthwhile effort (although some of the information was inaccurate) but these papers have remained largely unknown in Trinidad.

At around the same time the Trinidad and Tobago Field Naturalists' Club (T&T FNC) took an active interest in caves during their monthly field trips. They surveyed the Oropouche Cave and part of the Aripo Main Cave, and estimated the numbers of oil-birds in each (Quesnel 1976, 1978b).

The emergent river in the Oropouche Cave has stimulated much discussion and some field work. Stories are often told of ping-pong balls and other buoyant objects being thrown into the underground stream in Aripo Main Cave and later recovered from the Oropouche

River, but these may be apocryphal. In 1964 two scuba divers, Adam Richards and Victor Abraham, attempted to dive through the syphon at the head of Oropouche Cave but drowned about 200 m upstream from the pool. The rescue party reported that the roof of the channel was unstable, and one of the bodies was trapped by fallen rocks. No subsequent attempt has ever been made. Members of the T&T FNC have made several unsuccessful attempts to locate a sinkhole marked on an old survey map 2 km West of the cave (Quesnel 1978a, c) which might be one source of the water. The hydrology of this whole limestone area still remains to be explored.

In 1989 a cave was explored in the Aripo Valley of which no previous written record could be found, although it is clearly well known to local inhabitants. The cave contains a small colony of oilbirds. It was named the Soho Cave (Comeau 1991a) and a rough survey was made (still in manuscript). Another large cave nearby was explored by T&T FNC members in 1991 (Comeau 1991b). It fits the description given by Carricker (1931) of cave in which he narrowly escaped a dangerous fall. There are likely to be other new caves in this area, and also in another heavily forested area of limestone in the mountains north of Matura.

STUDIES ON BATS

An outbreak of paralytic rabies occurred in 1932 in Trinidad, affecting livestock and humans. The disease was found to be transmitted by vampire bats, *Desmodus r. rotundus*. This provided a tremendous stimulus to cave exploration in the island (eg de Verteuil and Urich 1936), and also to studies on bats in general, the viruses they carry, and their associated ectoparasites and bloodsuckers.

Taxonomic work on bats resulted in the publication of a monograph reporting 58 species to occur in Trinidad (Goodwin and Greenhall 1961). A more recent update lists 64 species (Carter et al. 1981). Much work has been done on the behaviour of vampire bats, and on methods to reduce their numbers (eg Greenhall 1968, 1970). Caves containing bat roosts were sought out, and in many cases the bats were needlessly destroyed where vampires formed only a small proportion of the bat population. It is now considered more efficient to catch the bats in mist nets when they approach livestock, or to poison them with a strychnine preparation painted onto the skin of the host (Greenhall 1970). Control of vampire bats remains the responsability of the Veterinary Department of the Ministry of Agriculture.

The feeding methods of the fishing bat *Noctilio leporinus* were studied by Griffin (1963). There have been several studies on reproduction in some cave-roosting bats (James 1977; Deoraj 1987) and on social behaviour and genetics in *Phyllostomus h. hastatus* in Guanapo Cave (McCracken and Bradbury 1977, 1981).

A number of viruses have been isolated from the blood of bats, other mammals, and birds by the Trinidad Regional Virus Laboratory (TRVL), now called the Caribbean Regional Epidemiology Centre (CAREC). The same organisation has done a lot of work on arthropod vectors, including cave-dwelling species (e.g. Wirth and Blanton 1971). No disease is known to have been spread directly from cave-dwelling invertebrates to humans,

although the potential exists. An example is the reduviid bugs *Panstrongylus geniculatus* in Tamana Dry Cave that were found to be infested with *Trypanosoma cruzi*, the causative organism of Chagas disease (Omah-Maharaj 1987).

HISTOPLASMOSIS

A different health problem associated with caves came to light in the 1960s. Histoplasmosis usually occurs as a lung disease resembling tuberculosis. The causative organism is a fungus *Histoplasma capsulatum*, which is commonly found in bird guano accumulated in communal roost sites or chicken houses, and also in guano deposits in bat caves. People who inhale the spores may suffer an accute form of infection called cave sickness or cave fever, which occasionally proves fatal. The fungus was found to occur in some Trinidad caves associated either with oilbird colonies or bat roosts (Ajello, Greenhall et al. 1962; Ajello, Snow et al. 1962). Retrospective diagnoses were later made of some previously unidentified illness associated with visits to the caves (Brown 1988).

OILBIRD COLONIES

Commercial interest in oilbirds as food waned in the earlier part of this century, but scientific interest has intensified, culminating in a detailed study by Snow (1961, 1962) on the small nesting colony in a river gorge that is variously called the Arima Gorge, Spring Hill Cave, Dunstans Cave, or the Asa Wright Cave. Snow (1962) also listed all known oilbird colonies in Trinidad, eight of them active and five extinct. The Spring Hill colony is monitored regularly, once a year since 1969 (National Audubon Society Christmas bird counts) and quarterly since 1987 (Elias, pers. comm.). Numbers of birds in the Oropouche Cave and the Aripo Main Cave are estimated from time to time by members of the T&T FNC on their field trips (Quesnel 1976, 1978b, 1985). The colonies in the sea caves have not been visited for many years, and the exact locations of some of them are now uncertain.

The species composition of the seeds regurgitated by the oilbirds (adults and young) in the cave at different times of year gave detailed information about the birds' food, and their role in dispersing plant seeds (Snow 1962). The plant debris thus brought into the cave, including seedlings that sprout from the regurgitated seeds where the cave floor is moist, provide the basis for a cave-dwelling biota of decomposer organisms and their grazers and predators, which has never been studied in detail.

CAVE ECOSYSTEM STUDIES

A combined project to study the bats, macrofauna and microbiota of the Tamana bat caves was planned in the late 1960s by Professor J.S. Kenny of the Zoology Department, University of the West Indies, Trinidad. In the event only the two latter topics were carried

out at that time, and even they had to be localised in different parts of the cave because of the small size and fragility of the cave ecosystem. Only part of this work has been published.

The Tamana Main Cave was mapped by J.S. Kenny and some of his students, omitting the deepest parts of the cave which still have not been explored. A brief description of the topography of the cave and an account of the atmospheric dynamics was published by Kenny (1978-79). A connection to the Tamana Dry Cave was explored in 1989 and the map extended (Fig. 1). Several new species of invertebrates were found in the caves, including a tineid moth (Davis 1972), a lygaeid bug (Scudder et al. 1967), a ptiliid beetle (Johnson 1969), a cetaropogonid fly (Wirth and Blanton 1971) and several other arthropods still to be described.

The study of the macrofauna showed that the Upper and Deep Parts of the main cave were occupied by analogous but different species, the Upper Part (and the Dry Cave) being more diverse that the hot, wet Deep Part where most of the bat roosts were located. The fauna in the Deep Part was dominated by a blaberine cockroach *Eublaberus posticus* which is a guano eater and general scavenger. The biomass and energy dynamics of this population were studied in detail, both in the cave and the laboratory (Darlington 1970).

The microbiota was studied in great detail in the Upper Part (Hill 1969). Compared with epigean soil the population densities were high (up to 19 times the highest previously recorded density for mites) but the number of species present was low. Guano of the fruit-eating bat *Phyllostomus h. hastatus* was decomposed initially through a bacteria-nematode food chain, and later through fungus-mite food chains. Insectivorous bat guano was eaten by a cockroach *Eublaberus distanti* and also attacked by a fungus *Penicillium janthinellum*, which was then grazed by mites. A summary of the results was published by Hill 1981.

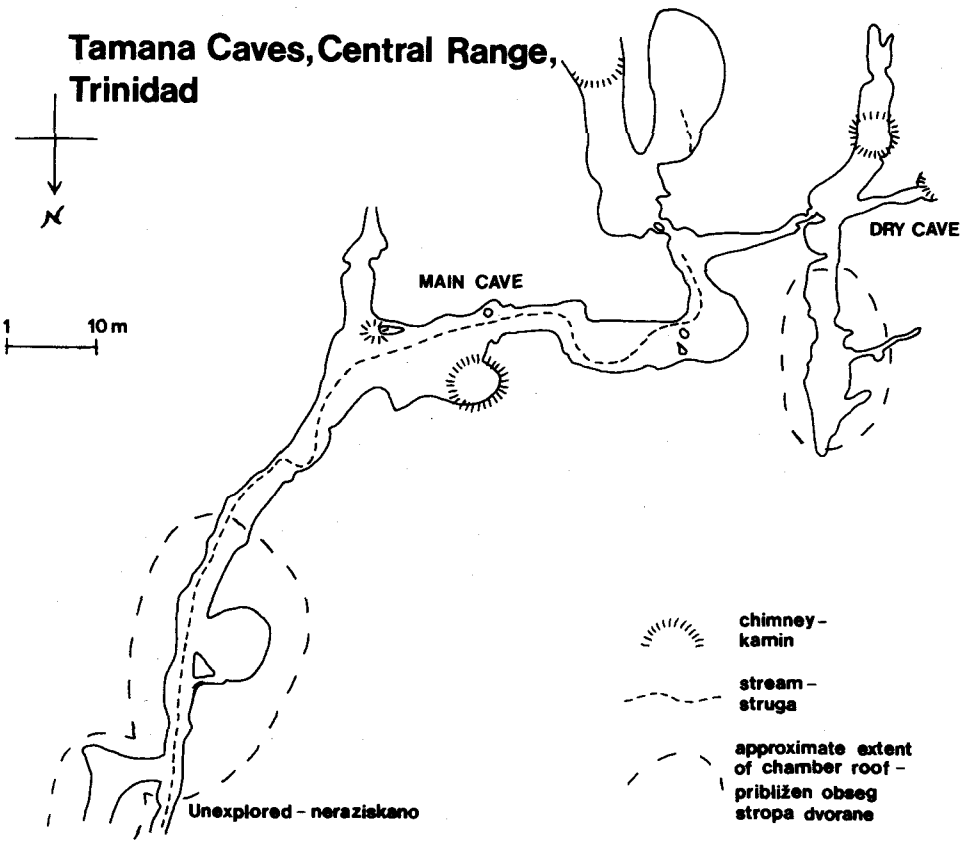
CAVES IN TOBAGO

Four small caves are known from near Crown Point in Tobago (Grady 1982). They were found to contain vertebrate fossils representing three distinct ages, and indicating changes in climate over the past 12.000 years (Eshelman et al. 1945).

WORK IN PROGRESS AND PROSPECT

Recreational visits to Trinidad caves continue, but a few people are more seriously interested in cave studies. T&T FNC members have been trying to re-locate some of the lost caves, and to improve the available information about the better known caves (Comeau 1991a, b). The Club has some basic caving equipment, but the level of caving experience among members is generally low.

A bibliography of all published information on caves in Trinidad and Tobago is available in draft (from the present author) but is not yet complete. An attempt is being made to


Tamana Caves, Central Range, Trinidad
N
1
10 m
MAIN CAVE
DRY CAVE
chimney - kamin
stream - struga
approximate extent of chamber roof - približen obseg stropa dvorane
Unexplored - neraziskano

trace all previous survey and sketch maps of the caves, although these vary greatly in quality. This will pinpoint which caves still need new or better survey work.

Specimens of cave animals have been collected over many years by overseas visitors. Some were subsequently identified or described (eg Haas 1962), while others remain unreported in collections. New material collected over the past few years is currently being studied. Results of a student project on flies in the Tamana Main Cave have been published (Jennings & Darlington 1990). A short paper on cave craneflies is in press (Darlington & Gelhaus 1993-4), and a monograph on phorid flies is in preparation (R.H.L. Disney). The gradual increase in available information makes cave studies increasingly attractive to students and research workers.

Table 1. Dimensions of some of the largest caves in Trinidad

Cave name	length	Source of information
Aripo Cave no. 1	853 m	Gunther 1940
"no. 2	152 m	"
"no. 3	305 m	"
Aripo Soho Cave	70 m	New survey, 1990
Oropouche Cave	214 m	G.M. & L.M.Miller, Jan. 1960
"	225 m	Quesnel 1976
"	215 m	Komisarcik 1979
Tamana Main Cave (incomplete survey)	130 m	+ J.S.Kenny, 1965
Tamana Dry Cave	50 m	New Survey, 1989

Tabela 1. Največje jame na Trinidadu

Ime jame	dolžina	Vir
Aripo Cave no. 1	853 m	Gunther 1940
"no. 2	152 m	"
"no. 3	305 m	"
Aripo Soho Cave	70 m	Nov načrt, 1990
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"	225 m	Quesnel 1976
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Tamana Main Cave (nepopoln načrt)	130 m	+ J.S.Kenny, 1965
Tamana Dry Cave	50 m	New Survey, 1989

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NOVEJŠE PREUČEVANJE JAM NA TRINIDADU IN TOBAGU

Povzetek

Večina danes znanih jam na Trinidadu in Tobagu je bila odkritih do 1950, vendar so slabo dokumentirane. Ta vrzel je bila v precejšnji meri zapolnjena v zadnjih treh desetletjih. Zaradi izbruha stekline je bila posebna pozornost posvečena preučevanju netopirjev, v zvezi z njimi pa tudi podzemeljskim jamam. Žal so bile uničene cele kolonije jamskih netopirjev, čeprav so vampirji - prenašalci bolezni, predstavljali le majhen delež take kolonije. V šestdesetih letih se je pojavilo vprašanje histoplasmose in izkazalo se je, da so tudi v nekaterih trinidadskih jamah, kjer so kolonije netopirjev ali ptic tolstičnikov (guacharo), glive - povzročiteljice te bolezni.

V zgodnjih letih tega stoletja so se ljudje zanimali za ptice tolstičnike predvsem kot vir prehrane, po 1960 pa so jih pričenjali preučevati iz znanstvenih in naravovarstvenih nagibov, kar je vzpodbudilo tudi raziskave jam, kjer so kolonije teh ptic.

Oddelek za biologijo Zahodnoindijske univerze v Trinidadu je izpeljal tudi deset let trajajočo ekološko študijo jamskega spleta Tamana, kar je dalo vrsto objavljenih študij o jamskih netopirjih, makro- in mikrofavni.

Avtor zaključi, da zanimanje za jame na Trinidadu in Tobagu raste, vedno več je zbranih podatkov in tudi vedno več zanimanja za nova preučevanja.