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THE STREAM FAUNA OF AN ISOLATED MOUNTAIN MASSIF; TABLE MOUNTAIN, CAPE TOWN, SOUTH AFRICA

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(With 1 text-figure)

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SUMMARY

An account is given of the stream fauna of Table Mountain. The analysis is based on intensive sampling, during all months of the year, in a selected stream, supplemented by collections from all the main streams on the mountain. An annotated faunal list includes records from published literature. It is pointed out that Table Mountain, with the rest of the Cape Peninsula Range, is virtually an island as far as the mountain stream fauna is concerned. This fauna is compared with that of the mainland mountains and reasons advanced for its paucity and lack of endemicity.

INTRODUCTION

The purpose of this paper is to make available certain unpublished records gathered by the late Dr. Keppel H. Barnard and to integrate these with other data, derived both from personal observations (A.D.H.) and from publications, into a unified account of the stream fauna of Table Mountain.

After the death of Dr. K. H. Barnard in 1964, numerous records were found amongst his private papers by his son, Mr. James Barnard, and handed to the Director of the South African Museum. Amongst these were records of regular collections made from 1931 to 1935 in the permanent streams in the lower Platteklip Gorge (fig. 1) and also notes on visits to the lower Blinkwater Stream and other streams on the mountain. All these records were passed on to the first author by the Director. Dr. Barnard's notes on the Platteklip Gorge covered 136 collecting visits, spread out over an annual range as follows: January, 5; February, 11; March, 13; April, 12; May, 15; June, 13; July, 9; August, 16; September, 9; October, 8; November, 15; December, 10.

DESCRIPTION OF THE REGION

Table Mountain is the northernmost and highest of the mountains of the Cape Peninsula (fig. 1). These mountains are an outlay of the Western Province Foldbelt Mountains but are separated from them by the Cape Flats and other low-lying ground, so that the nearest mainland mountains with permanent water are those around Stellenbosch, some 56 km away. According to Walker (1952), the separa-

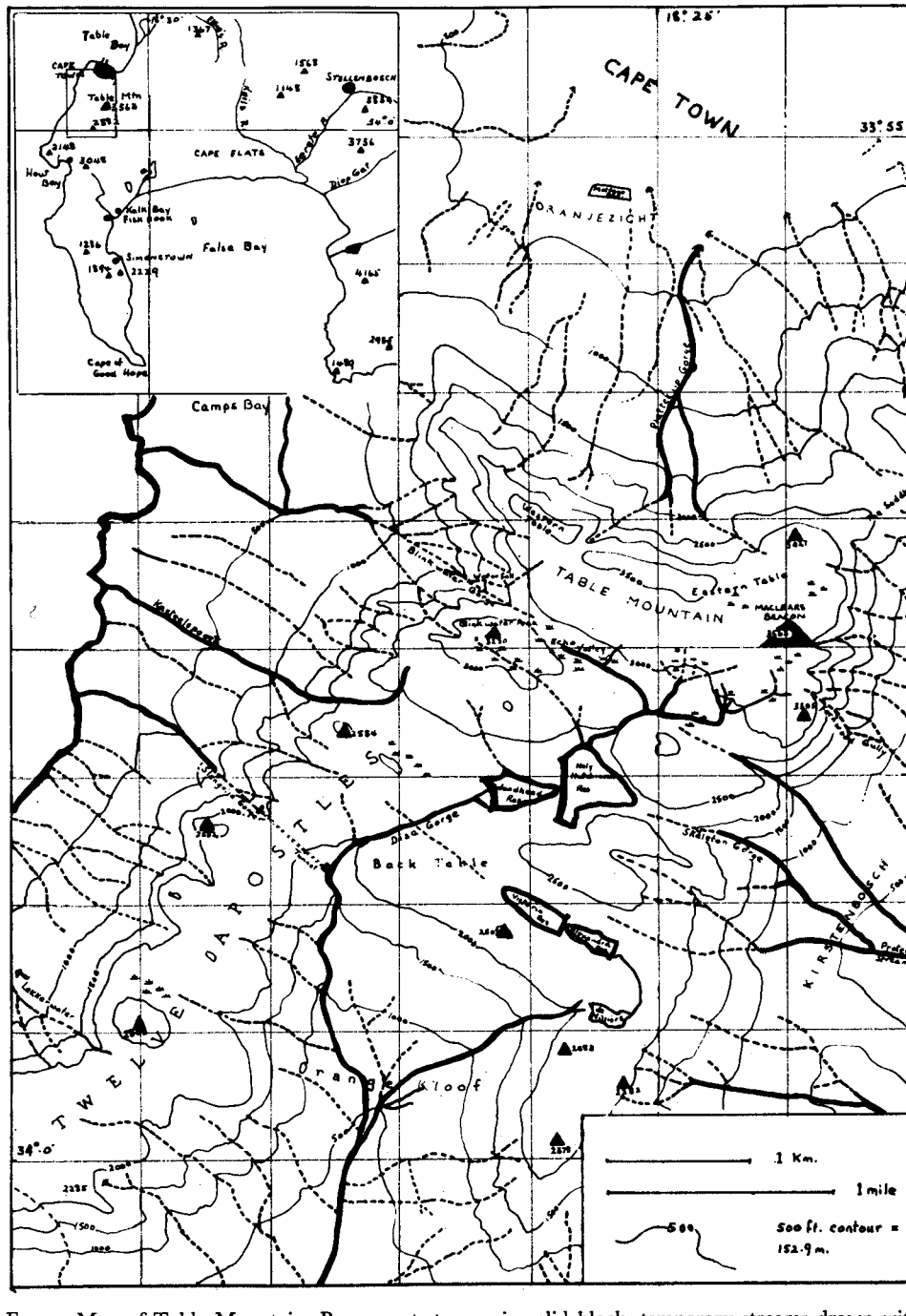

FIG. 1. Map of Table Mountain. Permanent streams in solid black, temporary streams drawn with a broken line.

tions began in the late Cretaceous and must have been accomplished in the Tertiary. Since that time much of the low-lying land has been under the sea more than once and the Cape Peninsula was an island until about 20 000 to 100 000 years ago.

The loss of the mountain bridge in the Tertiary remains the most important factor separating the fauna of Table Mountain from that of the 'mainland' mountains. The sluggish, strongly alkaline and even brackish streams of the intervening Cape Flats, in the restored land-connection with the mainland, are hardly more hospitable to the fauna of mountain streams than the sea. A survey of the Diep River, near Milnerton on the Cape Flats, by Millard & Scott (1953) revealed only species typical of lowland streams. A number of similar streams in this area have been examined personally (A.D.H.) and only lowland species found.

Table Mountain is a raised plateau rising to 1 111,4 m at Maclears Beacon and with sharply eroded sides, especially to the north. The mountain is noted for its spectacular cliffs, which are cut by gorges with their temporary or permanent streams. Usually, permanent running water is found only on the table or in the gorge streams below the 300 m level, such as those in Platteklip Gorge to the north, and at Kirstenbosch to the south east.

As the region has a Mediterranean climate, most of the rain falls in the winter months (June to August). Summer rainfall is low, but there is considerable condensation from heavy mountain mists, the famous 'Table Cloth', produced by the prevailing south-east wind, laden with sea moisture, being driven up over the mountain. This condensation probably prevents the table streams and some of the gorge streams from drying up altogether.

The mountain consists mainly of quartzitic rock, the Table Mountain Sandstone, but below 300 m, young Cape Granite intrudes so that the predominantly sandy soils give way in places to a more clayey type. Nevertheless, most of the run-off is from the Table Mountain quartzite and is very deficient in calcium and magnesium carbonates. As a result, all stream water is soft with an acid pH and is similar to that described for the mountain reaches of the Great Berg River by Harrison & Elsworth (1958). This condition continues throughout the summer in spite of considerable amounts of salts from sea spray, deposited on the mountain by the prevailing south-east wind. Waters running down sea-facing slopes, such as the Blinkwater Stream, are usually brown and peat-stained. Those from land-facing slopes, such as the Kirstenbosch streams, are not noticeably stained except during heavy winter rains.

Methods of Study

Most specimens were collected by a hand-net. The fauna of running water was caught by disturbing and rubbing stones upstream from the net. Fauna of pools was caught by sweeping. Careful on-the-spot examinations were made of the undersurfaces of larger submerged stones, and of torrents and waterfalls. Flying adults were collected in appropriate ways.

Results

The following annotated faunal list includes not only the records of the Barnard collections and of personal (A.D.H.) collections but also some by Dr. K. M. F. Scott (see Chironomidae) and others, indicated in the appropriate places, by Barnard's co-workers at the South African Museum.

Faunal List

TURBELLARIA

Lecitheopitheliata

Prorhynchus grincki Marcus. One specimen under water-soaked moss on rock wall at about 1 000 m. Collected by the Swedish South African Expedition in 1951. See Marcus (1955).

Tricladida

Common in streams on the mountain, probably *Dugesia* sp.; the Swedish South African Expedition collected *Cura evilinae* Marcus in the Cape Point Nature Reserve, Cape Peninsula.

HIRUDINEA

Glossiphonia disjuncta Moore. Small stream in Echo Valley. Swedish South African Expedition, Schiacchitano (1959).

CRUSTACEA

Isopoda

Phreatoicidae:

Phreatoicus capensis Brnrd. Streams on the Table, especially in Echo Valley. Barnard (1927).

The other freshwater isopod, *Protojanira prenticei* Barnard, common on Western Province mountains, was not found.

Amphipoda

Gammaridae:

Paramelita nigroculus (Brnrd.). Table, Platteklip and Kirstenbosch streams. Probably in all permanent streams.

Paramelita capensis (Brnrd). Common in most upper streams.

Paramelita crassicornis (Brnrd.). Common in small trickles and damp moss, apparently endemic to the mountain.

Paramelita auricularius (Brnrd.). Streams on Table; apparently endemic.

Barnard (1916, 1927), describes and discusses these species under the genus name *Gammarus*.

Decapoda

Potamonidae:

Potamoniae.

Potamonautes perlatus (Milne-Edwards). Common in all streams and reservoirs. See Barnard (1950).

Gecarcinucinae.

Gercarcinautes brincki Bott. First collected by P. Brinck from Blinkwater Ravine in 1950 (Bott, 1960); it is likely that some crabs identified by Barnard (1950) and others as *P. perlatus* were really this species.

ACARINA

Hydrachnellae:

Diversibates pilosus Viets. Skeleton Gorge Stream, October 1953. Other species must be present but no special effort has been made to collect them.

INSECTA

Megaloptera

Corydalidae:

Taeniochauliodes ochraceopennis Esb.-Pet. One record, above 1 000 m, Jan. 1930. See Barnard (1931).

No species of the other two genera of this family found in the Western Cape have yet been found on Table Mountain.

Plecoptera

Nemouridae:

Notonemourinae.

According to Illies (1961) this sub-family is found in the Southern Hemisphere only: South Africa, Madagascar, Australasia and South America. The following were found on Table Mountain:

Aphanicerca capensis Tillyard. Very common in lower Platteklip Stream, as nymphs, February to October; as imagos, April to November. Also in Orange Kloof Stream and other streams.

Aphanicercella barnardi Tillyard. Lower Platteklip Stream, as imagos, October. Upper Platteklip Stream, as nymphs, September; as imagos, March, April, September, November. Also from Kasteelspoort, Skeleton Gorge and other ravines, as imagos, June to November. Barnard (1934*b*).

Aphanicercopsis tabularis Brnrd. Streams on slopes of Table Mountain, July to October. Barnard (1934*b*).

The other Western Province genus, *Desmonemoura*, was not found.

Ephemeroptera

Baetidae:

Cloen lacunosum Brnrd. Reservoir on lower Platteklip Stream, imagos, Nov. and Dec. See Barnard (1940).

Austrocloeon africanum (E.P.). Platteklip Stream, imagos, April. Barnard (1940).

Austrocloeon virgiliae Brnrd. Platteklip Stream reservoir, imagos, Dec. See Barnard (1940).

Pseudocloeon vinosum Brnrd. Orange Kloof, imagos, March. See Barnard (1940).

Pseudocloeon magae Brnrd. Orange Kloof, imagos, March.

Baetis harrisoni Brnrd. Platteklip Stream, imagos, April. Nymphs were common in the Kirstenbosch streams and Upper Liesbeek River during most of the year.

Baetis bellus Brnrd. Platteklip Stream, imagos, April; nymphs, April.

Cenroptilum sudafricanum Lest. Platteklip Stream, nymphs, March and April; imagos, Feb. to Dec. Also in Orange Kloof, lower Blinkwater and Kirstenbosch streams. This is the commonest baetid nymph on the mountain.

Centroptilum excisum Brnrd. Lower Blinkwater Stream, and Kirstenbosch streams. Probably commoner during the dry months.

Leptophelbiidae:

Aprionyx tabularis (Eaton). A. E. Eaton found imagos near the Platteklip Stream in 1874 but none has been found there since. Barnard found nymphs and imagos of an *Aprionyx* in Orange Kloof in Nov. 1934, but did not assign them to this or any other species.

Adenophlebia dislocans (Wlkr.). Platteklip Stream, nymphs, Jan. to April and Aug. to Dec.; imagos, Jan. to April. Lower Blinkwater, imagos, March.

Adenophlebia peringueyella Lest. 'Table Mountain Slopes.' Barnard (1932).

Castanophlebia calida Brnrd. Platteklip Stream, nymphs, Jan. to Dec.; imagos, Jan. to Dec. Also in other streams.

Ephemerellidae:

See Barnard (1932, 1940) and Allen & Edmunds (1963).

Ephemerellina penicillata (Brnrd.). Platteklip Stream, nymphs, Jan. to Dec.; imagos, Oct. to Feb. These records tend to agree with the life history described by Harrison (1958). Lower Blinkwater Stream, nymphs, March. Nymphs have also been found in the Kirstenbosch streams.

Ephemerellina barnardi Lest. Orange Kloof, nymphs and imagos, Nov. 1934. Unidentified stations, nymphs, Aug. and Sept. 1933.

Heptageniidae:

None was found on the mountain although two species of *Afronurus* are found in the near-by mainland mountains. See Schoonbee (1968).

Odonata

See Barnard (1937) and Brinck (1955*b*).

Zygoptera

Synlestidae:

Chlorolestes conspicua Selys. Platteklip Stream, nymphs, Nov. to March; imagos, Feb. to May, and Aug. Lower Blinkwater

nymphs, March; imagos, Jan. to Aug. Common all over mountain.

Chlorolestes umbrata Selys. 'Table Mountain', Mar., Barnard (1937).

Protoneuridae:

Elattoneura fraenulata (Hagen). Orange Kloof, imagos, Jan.

Coenagriidae:

Pseudagrion caffrum (Burm.). Imagos from various localities from Nov. to March.

Enallagma glaucum (Burm.). Imagos generally common at most times of the year.

Anisoptera

Gomphidae:

Paragomphus cognatus (Rambur). Imagos and nymphs generally common most of the year.

Ceratogomphus pictus Selys. Imagos fairly common most of the year, nymphs probably confined mostly to reservoirs and large pools on table.

Aeschnidae:

Aeschna minuscula McLach. Imagos generally common for most of the year. Nymphs found in streams.

Aeschna rileyi Calvert. Imago reported from Blinkwater Ravine by Brinck (1955*b*).

Annax imperator Leach, subsp. *mauricianus* Rambur. General, at all times of the year. Nymphs mostly in reservoirs.

Libellulidae:

Syncordulia venator (Brnrd.). Orange Kloof, imagos, Nov. to Feb.; nymphs, Mar. to Oct. Imagos have been found at other localities.

Orthetrum falsum subsp. *capicola* Kimmins. Imagos generally common for most of the year. Nymphs, March and April in Platteklip Stream. Barnard (1937) calls this species *O. stemmale capense.*

Orthetrum rubens Brnrd. Kirstenbosch, imagos, Jan.

Imagos of the following additional species of *Orthetrum* have been found on near-by Peninsula mountains:

O. brachiale (De Beauvais) and *O. chrysostigma* (Burm.), Skoorsteenkop, Hout Bay by Brinck (1955*b*).

Nesciothemus farinosum (Forst.) was found in the Kalk Bay Mountains by Barnard (1937).

Crocothemis erythraea (Brulle). Imagos common at all seasons.

Crocothemis sanguinolenta (Burm.). Kirstenbosch, imago, Brinck (1955*b*).

Sympetrum fonscolombei Selys. Generally common but probably does not breed on mountain.

Trithemis dorsalis (Rambur). Imagos generally common.

Trithemis arteriosa (Burm.). Imagos generally common.

An imago of *Trithemis risi* Longfield was found on nearby Skoorsteenkop, Hout Bay by Brinck (1955*b*).

Heteroptera

Gerroidea:

The following were collected by the Swedish South African Expedition. See Poisson (1956).

Gerris swakopensis (Stall). These specimens came from Skoorsteenkop, Hout Bay but Gerrids are common on Table Mountain.

Ocellovelia germani (Distant). Blinkwater.

Microvelia alluaudi f. *natali* Poisson. Kirstenbosch.

Paraphrynovelia brincki Poisson. Echo Valley.

Hebrus (*Subhebrus*) *houti* Poisson. Small stream on Table Mountain and on Skoorsteenkop, Hout Bay.

Specimens of *Hebrus* (*Hebrus*) *violaceus* Poisson were found on near-by Little Lion's Head, Hout Bay.

Notonectidae:

Notonecta (*Paranecta*) *lactitans*. Streams and reservoirs on the table. Brinck collected it in the upper reaches of the Blinkwater Stream, (Poisson, 1956).

A number of other Notonectidae and Corixidae are common in the reservoirs on the table but are not usually found in streams. See Poisson (1956) and Hutchinson (1929) for accounts of these.

Trichoptera

See Barnard (1934*a*, 1940).

Sericostomatidae:

Dyschimus thrymmifer Brnrd. Larvae in slow-flowing streams of table.

Petroplax caricis Brnrd. Platteklip Stream, larvae, Oct. and Nov.; imagos, Oct. to March. Also imagos from Orange Kloof (March), Fernwood (Feb.) and Kirstenbosch streams (Dec.).

Barbarochthon brunneum Brnrd. Streams above 300 m.

Molannidae:

Petrothrincus circularis Brnrd. Echo Valley, larvae, throughout the year; imagos, Feb. to April.

The other Western Province species, *P. triangularis* Hagen, was not found.

Leptoceridae:

Athripsodes scramasax (Brnrd.). Platteklip Stream, larvae, Feb. to April and Aug.; imagos, Aug. to Dec. Lower Blinkwater Stream, larvae, Apr. and Aug.; imagos, Aug. to Oct. Kirstenbosch and Fernwood, larvae, Nov. and Dec.; imagos, Dec.

Athripsodes potes (Brnrd.). Lower Blinkwater Stream, imagos, Sept.

Athripsodes tabularis (Brnrd.). Imagos found on top and upper slopes, Feb. to Apr. This species appears to be endemic to Table Mountain but larvae have yet to be found.

Other species of *Athripsodes* found on near-by mountains are *A. schoenobates* (Brnrd.), *A. harrisoni* (Brnrd.) and *A. corrivalis* (Brnrd.) in the Silvermine Stream, behind Kalk Bay.

Leptecho scirpi (Brnrd.). Echo Valley and Orange Kloof, larvae and pupae, March.

Oecetis modesta (Brnrd.). Orange Kloof, imagos, March.

Hydropsychidae:

Cheumatopsyche maculata (Mosely). Kimmins (1960) examined the type specimen of *Cheumatopsyche lateralis* Barnard and found it to be a synonym of *Ch. maculata*, as suggested by Barnard (1940). This specimen came from the lower Blinkwater Stream above Camps Bay. The following records are referred to this species though some could have been *Ch. afra* (Mosely). Platteklip, larvae, Jan., Apr., Sept.; imagos, Jan. and Sept. Lower Blinkwater Stream, larvae, July to Sept.; imagos, Sept.

Philopotamidae:

Chimarrha ambulans Brnrd. Platteklip Stream, larvae, Jan. to May, July to Dec.; imagos, Jan. to Dec. Common also in the Blinkwater and other streams.

Thylakion urceolus Brnrd. Barnard (1934*a*), notes 'This species is found in the upper parts of swiftly flowing streams on Table Mountain and does not overlap with *Chimarrha ambulans*'. Found throughout the year.

Hydroptilidae:

Hydroptila capensis Brnrd. Orange Kloof, larvae and imagos, March. This species can be expected in any quiet pool or sheltered spot where *Spirogyra* is present.

Oxyethira velocipes (Brnrd.). Kirstenbosch streams and reservoirs on Table. Larvae are to be found in standing water or quiet localities in streams at any time of the year.

Diptera

Psychodidae:

See Satchell (1956).

Pericoma sp., undescribed species. Platteklip Stream, larvae, Jan. to Dec.; imagos, Jan. to Dec.

Telmatoscopus sp. Platteklip Stream, larvae, Mar.; imagos, March, April, Sept. Satchell (1956) collected *T.* (*Arisemus*) *patersoni* Satch. on Table Mountain.

Tipulidae:

See Wood (1952) and Alexander (1964).

Tipula (*Acutipula*) *jocosa* Alex. Platteklip Stream, larvae, April,

May, Sept. to Dec.; imagos, March to May, Nov. Larvae often found in mats of *Juncus* plants at stream margins.

Nephrotoma antennata (Wiedemann). Platteklip Stream, imagos, May and June. Larvae found in rich soil along margins of forest streams.

Limonia (*Dicranomyia*) *tipulipes* (Karsch). Platteklip Stream, larvae, Feb. to May, Aug. to Nov.; imagos, March, April, Nov., Dec. Larvae found in slime tubes on rock surfaces covered with thin film of flowing water.

Limonia (*Limonia*) *capicola* (Alex.). Platteklip Stream, imagos, Oct. to April. Also Kasteelspoort, Kirstenbosch and other streams. Wood (1952) found larvae in moss on edge of rapidly flowing streamlet in Kasteelspoort.

Limonia (*Geronomyia*) *sexocellata* (Alex.). Platteklip Stream, larvae, Dec.; imagos, Oct. to March. Larvae in gelatinous tubes sprinkled with minute sand grains, attached to moss in small trickles.

Limnophila (*Elaeophila*) *dubiosa* Alex. Platteklip Stream, larvae, Nov. to Feb.; imagos, Nov. to April. Also Kirstenbosch and Fernwood streams. Larvae found in gravelly sand with organic mud at margins of shallow streams.

Limnophila (*Elporiomyia*) *crepuscula* Wood. Platteklip Stream, larvae, Nov.; imagos, Dec. Also from Orange Kloof and Kasteelspoort. Larvae in sheltered places in stream beds.

Elephantomyia (*Elephantomyia*) *aurantiaca* Alex. Platteklip, imagos, Nov. 'Other parts of Table Mountain' (Wood, 1952). Larvae in damp moss and liverworts.

Rhabdomastix (*Sacandaga*) *afra* Wood. Platteklip Stream, larvae, Nov.; imagos, Nov., Dec. Also Orange Kloof. Larvae in sheltered places.

Dolichopeza spp. Platteklip Stream, unidentified imagos in March and April.

Dolichopeza (*Trichodolichopeza*) *barnardi* Wood. Echo Valley. Wood (1952).

Dolichopeza (*Trichodolichopeza*) *hirtipennis* Alex. Echo Valley, Lekkerwater and Kirstenbosch. Wood (1952).

Dolichopeza (*Trichodolichopeza*) *perigueyi* Alex. Oranjezicht. Wood (1953). Immature stages of this sp. and the two previous ones to be found in or beneath wet cushions of moss or liverwort on the sides of waterfalls.

Ceratopoginidae:

See De Meillon (1959) and De Meillon & Hardy (1953).

Atrichopogon spp. Platteklip Stream, larvae, Jan. to Aug.

Atrichopogon turneri I. & M. Platteklip Gorge below lower cable

station, imagos. Scott (private comm.).

Atrichopogon hirsuitipennis I. & M. Kirstenbosch.

Culicoides spp. Platteklip Stream, unidentified larvae, Jan. to May.

Ceratopogon spp. Platteklip Stream, unidentified larvae, Jan. to May.

Numerous species of *Culicoides*, *Ceratopogon* and other ceratopogonids have been recorded from the Cape Peninsula.

Chironomidae:

For Chironomidae of the Western Cape Province see Freeman (1955, 1956, 1957, 1958) and Scott (1958). Listed species attributed to Scott were collected from 1952 to 1955 (pers. comm.). The Swedish South African Expedition records are from Freeman (1955).

Podonominae:

The paleo-endemic podonomids discovered in the Western Cape Province by Brundin (1966) have not yet been found on Table Mountain. This is probably because his special collecting techniques have not been used.

Tanypodinae:

Pentaneura meilloni Freeman. Kirstenbosch, Scott. Following advances in the taxonomy of this sub-family, this species will have to be placed in a new genus near *Paramerina* Fittkau.

Orthocladiinae:

Barnard collected larval Orthocladiinae regularly but was unable to identify them. Imagos have been collected and identified subsequently. After examining the types in the British Museum of Natural History, the classification of this sub-family has been revised (A.D.H.) in accordance with the generic system proposed by Brundin (1956).

Eukiefferiella biloba Freeman. Platteklip Gorge and Kirstenbosch. Scott.

Orthocladius (*Eudactylocladius*) *lobiger* Freeman. Kirstenbosch. Scott.

Orthocladius (*Orthocladius*) *bergensis* Freeman. Blinkwater Ravine. Swedish South African Expedition.

Syncricotopus micans (Kieffer). Kirstenbosch. Scott.

Cricotopus dibalteatus Freeman. Platteklip Gorge. Scott.

Cricotopus flavozonatus Freeman. Kirstenbosch, Scott.

Rheocricotopus capensis (Freeman). Kirstenbosch. Scott.

Limnophyes natalensis Kieffer. Platteklip Gorge and Kirstenbosch. Scott.

Parametriocnemus scotti (Freeman). Platteklip Gorge. Scott.

Pseudorthocladius similis Freeman. Platteklip Gorge. Scott.

Pseudosmittia conigera Freeman. Platteklip Gorge. Scott.

Pseudosmittia rectilobus Freeman. Blinkwater Ravine. S. Afr. exp.

Corynoneura dewulfi Goetghebeur. Kirstenbosch. Scott.

Thienemanniella lineola Freeman. Kirstenbosch. Scott.

Chironominae:

Chironomini

Chironomus (*Chironomus*) *formosipennis* Kieffer. Platteklip Stream larvae, Dec.; imagos, Oct. to July. Larvae are found in sheltered, spots.

Chironomus (*Chironomus*) *caffrarius* Kieffer. Kirstenbosch. Scott.

Chironomus (*Chironomus*) *pulcher* Wiedemann. Platteklip Gorge and Kirstenbosch. Scott.

Polypedilum (*Polypedilum*) *annulatum* Freeman. Kirstenbosch. Scott.

Polypedilum (*Pentapedilum*) *anale* Freeman. Kirstenbosch. Scott.

Tanytarsini

Tanytarsus (*Tanytarsus*) *luctuosus* Freeman. Platteklip Gorge. Scott.

Tanytarsus (*Cladotanytarsus*) *linearis* Freeman. Platteklip Gorge. Scott.

Tanytarsus (*Rheotanytarsus*) *fuscus* Freeman. Kirstenbosch. Scott. For life history, see Scott (1967).

The Swedish South Af. Exp. recorded the following from near-by Skoorsteenkop, Hout Bay: *Chironomus* (*Chironomus*) *callichirus* Kieffer, *Chironomus* (*Dicrotendipes*) *pencillatus* Freeman and *Polypedilum* (*Polypedilum*) *griseoguttatum* Kieffer.

Simuliidae:

Nomenclature is according to Crosskey, 1969. Larvae were found regularly in the Platteklip and Kirstenbosch streams but were not identified to species. However, the following identified pupae and adults were collected on the mountain.

Simulium (*Metomphalus*) *medusaeforme* Pomeroy. Platteklip and Kirstenbosch streams.

Simulium (*Metomphalus*) *vorax* Pomeroy. On the table. Swedish S.Af. Exp. (De Meillon, 1955).

Simulium (*Eusimulium*) *nigritarsis* Coquillet. Platteklip Stream.

Simulium (*Eusimulium*) *rutherfoordi* de Meillon. Skeleton Gorge Stream. This species prefers shaded streams.

Simulium (*Anasolen*) *dentulosum* Roubaud. Platteklip Stream.

Simulium (*Pomeroyellum*) *merops* De Meillon. Orange Kloof.

Prosimulium (*Paranephia*) *harrisoni* (Freeman & De Meillon). Protea Stream, Kirstenbosch, larvae and adults, Sept. 1951. This species is not recorded by Freeman & De Meillon (1953) nor by de Meillon (1955) but the specimens were identified by Dr. B. de Meillon.

Prosimulium (*Paranephia*) *thornei* (De M.). Blinkwater Falls, pupae, Sept. and Oct. Barnard and Thorne (de Meillon, 1955).

Prosimulium (*Paranephia*) *brincki* (De M.). Blinkwater Falls, pupae, Sept. and Oct. Barnard and Thorne.

The last two species appear to be endemic to the mountain, but past experience with this subgenus indicates that they could easily turn up on the mainland should their preferred habitat, temporary mountain streams, be investigated more thoroughly. For Simuliidae of the Western Cape Province see Freeman & De Meillon (1953).

Dolichopodidae:

Tachytrechus sp. Platteklip Stream, larvae, Nov. to May; imagos, Jan. to Dec.

Pelastoneuris brincki Vansch. Blinkwater Ravine. Brinck (see Vanschuytbroek, 1960).

Rhagionidae:

See Bezzi (1926) and Stuckenburg (1960).

Atherix sp. Platteklip Stream, larvae, Dec.; imagos, Dec. to April.

From near-by Hout Bay, Brinck collected *Atherix barnardi* Bezzi and *A. adamastor* Stuckenberg.

Pachybates incompleta (Bezzi) s.sp. *adeps* Stuckenberg. Kirstenbosch. Brinck (Stuckenberg, 1960).

Blepharoceridae:

See Barnard (1947) and Stuckenberg (1956).

Elporia barnardi (Edwards). Platteklip Stream, larvae, May to early Jan. but none during Feb. to April; pupae, Aug. to Jan. Common in other streams on the mountain.

Dixidae:

Dixa (?) spp. Platteklip Stream, larvae, all months.

Culicidae:

See Muspratt (1953*a*, *b*; 1955).

Aedes (*Finlaya*) *barnardi* Edwards. Kirstenbosch streams, imagos. Muspratt (1953*b*).

Aedes (*Ochlerotatus*) *harrisoni* Muspratt. Skeleton Gorge Stream, imagos, Sept. Muspratt (1953*a*).

Anopheles ardensis Theobald. Platteklip Stream, larvae and pupae, Jan. to May. (Identified by F. W. Edwards, 1933.)

Many other species of mosquitoes are to be found on the mountain, such as *Culex* (*Neoculex*) spp., but most breed in small, temporary rock pools.

Ephydridae:

Notiphilinae.

Paralimna puncticollis Becker. Skoorsteenkop, Hout Bay. Swedish S.Af. Exp. See Wirth (1960).

Ephydrinae.

Scatella stagnalis (Fallen). Table Mountain at 2 000 ft. Swedish S.Af. Exp. See Wirth (1960).

Anthomyidae:

'Two-pronged larvae.' Platteklip Stream, Dec. and Feb. Feeding on *Elporia barnardi.*

'Four-pronged larva,' '*Calliophrys.*' Platteklip stream, small trickle at reservoir, April and May.

Coleoptera

Dytiscidae:

No intensive collecting for this group has been carried out on the mountain. Experience with the upper Berg River (Harrison & Elsworth, 1958) has shown that few dytiscids breed in mountain streams, but that adults of many species that breed in temporary and permanent pools often appear in stream backwaters. See Omer-Cooper (1962) for Dytiscidae of the Cape Province, and Omer-Cooper (1965).

Potamonectes capensis Omer-Cooper. Kirstenbosch ponds and streams.

Gyrinidae:

Gyrinus vicinus Aube. Table Mountain. Brinck (1955*a*).

Dineutus (*Protodineutus*) *punctatus* Aube. Table Mountain. Brinck (1955*a*).

Aulonogyrus (*Afrogyrus*) *splendidulus* (Aube). Table Mountain. Brinck (1955*a*).

Aulonogyrus (*Afrogyrus*) *formosus* (Modeier). Table Mountain. Brinck (1955*a*).

Aulonogyrus (*Afrogyrus*) *abdominalis* (Aube). Table Mountain. Brinck (1955*a*).

Aulonogyrus (*Afrogyrus*) *marginatus* (Aube). Table Mountain. Brinck (1955*a*).

Orectogyrus (s.str.) *conformis* Regimbart. Table Mountain. Brinck (1955*a*).

Only two additional species have been reported from adjacent mainland mountains: *Aulonogyrus* (*Afrogyrus*) *capensis* Thunberg and *A.* (*Afro.*) *varians* Brinck.

Dryopidae:

See Deléve (1964*b*).

Strina aurichalcea Redtenbacher. Orange Kloof and Blinkwater. H. Andraea.

Strina promontorii Peringuey. Platteklip Gorge.

Rapnus raffrayi Grouvelle. Blinkwater. H. Andraea.

Helminthidae:

See Deléve (1964*a*, 1966).

Elpidelmis capensis (Grouvelle). Top of pipe track stream, June. Devil's Peak, March, by J. Balfour-Browne.

Peloriolus granulosus (Déleve). Top of pipe track stream, June.

Leilmis georyssoides (Grouvelle). Protea Stream, Kirstenbosch, Feb. Blinkwater, March. J. Balfour-Browne.

Hydraenidae:

J. Balfour-Browne of the British Museum (Natural History) is revising this family and describing many new species from the Western Cape Province. It would seem that there are a number of palaeo-endemic genera, so, as many cannot fly, the distribution should be interesting.

PISCES

Galaxidae:

Galaxias zebratus Castelnau. Found in the lower parts of the Protea Stream, Kirstenbosch and Hout Bay Stream. It impinges slightly on the true mountain zone.

Anabantidae:

Sandelia capensis (Cuvier and Valenciennes). Found in the lower parts of Kirstenbosch streams, but is not a mountain species.

AMPHIBIA

Anura

Heleophryne rosei. Tadpoles common in torrential streams in most of the gorges; they attach to rocks and stones by means of their sucker-like mouths. Adult rarely found (but see Gow, 1963).

The tadpoles of other toads and frogs are not adapted for life in torrential mountain streams but are found in backwaters on the lower slopes and in pools and reservoirs on the table. Among the more common tadpoles are those of *Rana grayi grayi* Smith and *R. fuscigula* Dumeril and Bibron. Adults and tadpoles of *Xenopus laevis laevis* (Daudin) are common in the reservoirs. For details see Inger (1959), Rose (1962) and Wager (1966).

Discussion

Most of the species listed in this paper come from montane streams which can be placed in the upper two river zones used by Harrison & Elsworth (1958), namely, the source zone and the mountain torrent zone. Illies (1961) in his zonation scheme for rivers and streams of the world, called these the mountain source zone and the epirithron. Harrison (1965*a*) discusses the African species typical of these two zones and points out that they appear to be mostly cold-stenothermal, rheobiontic forms mixed with more widespread eurythermal forms. Examples of the latter found on Table Mountain are *Baetis harrisoni*, *Centroptilum excisum*, *Simulium nigritarsis* and most of the Chironomidae.

According to Harrison (1965*b*), many of the cold-stenothermal forms appear to belong to a palaeo-endemic element constituting the remains of the Mesozoic fauna, with Gondwanaland affinities. This element is represented on Table Mountain by the Isopoda, Amphipoda, Corydalidae, Notonemourinae, some of the Leptophlebii-

dae, the Ephemerellidae, Synlestidae, Sericostomatidae and Molannidae, the Blepharoceridae and the Helminthidae.

With the exception of the endemic Gammaridae, all the species comprising this element are also found in the mainland mountains. Few, if any of them, could cross the intervening Cape Flats except as flying or wind-dispersed migrants, for, as mentioned in the introduction, none can establish breeding colonies in the sluggish, intermittent streams there. In addition, Harrison & Agnew (1962) have shown that many of these species are adapted to live only in the soft, acid water running off the Table Mountain quartzites and so the alkaline water of the Cape Flats would be nothing but a barrier to them. In fact, none has ever been found in them (Millard & Scott (1954) and numerous personal observations by A.D.H.).

As for *Phreatoicus capensis* and the Gammaridae, the land bridge is as uncrossable as the sea water which has flooded it from time to time; their gene pools must have separated from those on the mainland by the late Tertiary, if Walker's (1952) time-table is correct. It is not surprising that nearly all the Gammaridae on Table Mountain are endemic species and that the *P. capensis* from the mainland show small, but consistent, morphological differences. The insects, most of which have flying adults, show no endemicity, so there must be some active or passive dispersal to and from the mainland. The gene flow would not have to be large, as selection pressure would appear to be very similar in both regions.

The other main feature of the palaeo-endemic fauna is its relative paucity when compared with that of mainland mountains. This is shown in Table 1. Impoverishment could have taken place during dry periods in the pliocene and pleistocene, although there is no real evidence to show that the climate was actually drier in the Western Cape Province during these times.

TABLE 1
Number of known species of insects from mountain streams.
Table Mountain and nearest mainland mountains compared.

	Table Mountain	*Mainland Mountains*		*Table Mountain*	*Mainland Mountains*
Megaloptera			*Trichoptera*		
Corydalidae . . .	1	4	Sericostomatidae . .	3	12
			Molannidae . . .	1	1
Plecoptera			Leptoceridae . . .	6	21
Notonemourini . .	3	12	Hydropsychidae . .	2	3
			Philopotamidae . .	2	2
Ephemeroptera			Rhyacophilidae . .	0	2
Baetidae	6	6			
Leptophlebiidae . .	4	10	*Diptera*		
Ephemerellidae . .	2	5	Simuliidae	9	12
Heptageniidae . .	0	2	Blepharoceridae . .	1	4
			Coleoptera		
			Dryopidae. . . .	3	7
			Helminthidae. . .	3	13

Some species may be missing because they need fairly large mountain rivers which do not occur on the Cape Peninsula, but this would not apply to all. If one holds to the hypothesis that a steady flow of mainland immigrants was necessary to have prevented the development of endemicity, one would then have to explain why some mainland species have not become established or re-established during recent times. Missing species which should be able to find suitable habitats are the mayflies *Choroterpes* (s.str.) *nigrescens* Barnard, *Choroterpes* (*Euthraulus*) *elegans* Barnard, *Ephemerellina harrisoni* (Barnard), *Afronurus* spp., some Leptocerid caddis flies and *Agapetus agilis* (Barnard), and the Blepharoceridae of the near-by Hottentots-Holland and Stellenbosch Mountains.

There are probably three main reasons for the paucity of the stream fauna on Table Mountain. First, some palaeo-endemic forms have become extinct as conditions are no longer suitable for them; streams are small and are reduced to a mere trickle towards the end of the summer. Recolonization might take place from time to time but colonies would not be able to survive an unusually dry year. *Aprionyx tabularis* may be a case in point.

Second, some species may have evolved in the near-by mainland mountains since the separation in the Tertiary; among these could be some of the stone flies (Notonemourinae) as these show some endemicity between different ranges of the Cape Fold Belt Mountains.

Third, some mountain forms are not palaeo-endemic and could have migrated into the Western Cape Mountains during the Quaternary, but have not been able to cross the barrier of the Cape Flats. Among these are species of *Choroterpes* and *Afronurus*, which are less stenothermal and more widespread than other mountain forms and would appear to have migrated from the north, following the same route as the baetid mayflies and some Simuliidae. Their absence from Table Mountain and the rest of the Cape Peninsula is somewhat puzzling, but they could be among those species which require larger streams than are available for their populations to maintain themselves over exceptionally dry summers.

The evidence provided by the palaeo-endemic and other mountain stream species found on Table Mountain should be taken into account when discussing the stream fauna of African islands. Madagascar, for instance, has high mountain streams which are inhabited by at least a few species with affinities to the palaeo-endemic forms of the Cape Fold Belt and Drakensburg Mountains. Among these are the Notonemourinae, a group not found north of the Limpopo River.

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