

WALKERANA

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AFRICAN ADVENTURE 1924

Mina L. Winslow¹

An exciting prospect appeared to me in 1924 when I was curator of mollusks in the Museum of Zoology of The University of Michigan. Letters from Dr. Anna Grace Newell, a former teacher and friend at Smith College arrived. She wrote enthusiastically urging me to come to South Africa, where for two years she had been teaching in a college near Cape Town. After eight years of routine, the prospect of such a trip made me apply for a leave of absence from the museum. It was granted with the proviso that I collect specimens not only for my department but also for the departments of insects and reptiles and amphibians.

So the necessary outfit was assembled and I went to New York to embark in Hoboken on the S.S. America. To reach Plymouth, England, took nine days, and another six hours by train to London. It was Good Friday and except for Saturday morning no business was resumed until Tuesday. The weekend was warm and sunny and I enjoyed seeing London with friends, a delightful interim.

On Tuesday, business took me by bus to get a permit for the target pistol I carried and to have a visa for Africa added to my passport, a serious omission at an earlier office. Embarking on the "Durham Castle" at Tilbury, the old ship was small; in fact, I took it for a tender. A voyage of 23 days to Cape Town seemed a big undertaking for her.

My roommate in the small cabin was a short, solidly rotund lady, very British. She was never squeamish, even on the very bad days in the Bay of "Bisky" as she called it. She ate three seven-course meals a day. She donned her suit each morning, her brooches and watches and satin hat, and then sat in the lounge all day netting interminably. Our cabin was full of her luggage, even in the upper berth. I tried the couch, which was so narrow that I had to get up to turn over and rearrange my joints to avoid over-balancing and falling to the floor. After a few days I bought a single cabin on an upper deck.

¹Mina L. Winslow (1890-1982) was the first curator of mollusks (from 1914 until 1929) in the Museum of Zoology, The University of Michigan. One of the highlights of her career as a malacologist was a collecting trip she took to southern Africa in 1924. "African adventure 1924", written by Miss Winslow in 1980 for a writing class, is a brief account of some of her adventures on that trip. — EDS.

The passengers were solid British except the motley group in steerage. Business and professional people and travellers returning home made the ensemble a far cry from the cruisers of later years.

Of the crew, the man who announced meals by bugle I found on deck back of a wind-curtain. He was a small thin man with a thin red nose and wore a white steward's jacket. The bugle he held was the most dented and toy one you can imagine. I forgave him an occasional false note.

The crew as a whole were hard-working, rather pathetic, augmented by a number of small boys in motley clothes who did odd jobs.

My choice of table-mates was unfortunate: it included the ship's doctor and two hard-boiled widows who insisted on having the doctor drink with them. He was in bad shape, fighting alcoholism, and I often saw him on deck, alone, a picture of despondency.

The weather became better after the Bay of Biscay, where the waves came from all directions at once and made almost everyone sick — except my roommate! As we proceeded south, the days were warmer and often sunny and pleasant. The old ship took the long waves easily, though the roll made dancing on deck a question of holding back or climbing up the uncertain floor.

Deck games and a few special events were organized. A small orchestra played occasionally and chairs on deck were readied for Sunday services. The flying fish and later on whales and porpoises added to the small pleasures of walks on deck, and the splendid changing lights and color on the great expanse of water were a constant interest, sometimes a delight and sometimes a dream-like bore. High winds and rain often kept us inside in the hot, stuffy, red plush interior.

The Canary Islands were the first of three short stops on the schedule. We anchored and a launch took us ashore to see the Cathedral and the city of Las Palmas. The auto bus took us through the Spanish-looking streets, the houses flush with the sidewalks and with grilles at the windows. The girls wore black veils over heads and faces, goats in droves and overladen donkeys were part of the scene, and the city square had palms and flowers. The sun was hot, that first of May.

The second stop of the voyage was at Ascension Island, almost on the Equator. We anchored off shore. It is a weird sight, a series of volcanic cones, one higher one, "Green Mt.," with a cloud on its top and the appearance of trees. The rest of the island is bare, reddish brown, covered except on some steep slopes with pale green, perhaps lichens. Two stretches of sandy beach looked inviting but sharks keep bathers away. No trees, no bushes, no springs. The colony of Eastern Telegraph

people refer to it as "that cinder hump". Everything must be brought in by boat about once a month, often the huge waves preventing tenders from reaching the boat.

In the translucent blue water, thousands of fishes swarmed to bread thrown from the deck, actually piling up above the water line. Buckets were lowered under them and brought to the deck. They were of fair size and beautiful iridescent blue in color but flat and of no good as food.

Passengers embarked for St. Helena, Cape Town, etc., and eight others left us to replace them for a scheduled two years. By half past eight we were on our way again, the island disappearing soon in a haze.

The third and last stop was at St. Helena on May 11. We could not go ashore because of being in quarantine. A woman passenger, before embarking, visited children who had measles, and a whole half deck had to be closed off. About 10:30 P.M. we were anchored off St. Helena in brilliant moonlight, then rain showers and clouds. I hung over the rail to watch unloading, passengers and many dusky men with baggage and chests to carry. Natives were not allowed on board but bargained for bead bags and chains that were sent up in bags to our deck. The winches went all night. In the morning the beautiful island could be seen: huge rocky promontories and the town in a valley. Before we left at 7:00 A.M., a rainbow dipped into the water nearby. The green and lovely country above the cliffs could be seen as we went away.

Cape Town was not far away now and bets were made on the date of arrival. Birds followed the ship now, some large ones called Molly or Cape gulls, and sharks were following us too. We were in sight of land on the 18th of May but had to lie in the harbor from 4 o'clock and overnight. In the clear air we had a wonderful view of the land and a golden sunset. The southwest wind was blowing, freezing cold. Whales spouted and the wet head of a seal showed. The gorgeous evening light showed Table Mountain and other points on shore, the moon full and brilliant making it light as day. The water was a sheet of light and the cloud known as the Tablecloth was white and soft. On one side of Cape Town the mainland and ranges of mountains showed above the horizon. It was a beautiful and thrilling sight at the end of the long voyage.

There on the dock was my friend Anna Grace Newell, who had had to wait from 7 to 9 o'clock when we were allowed to disembark. The moon was still up and I discovered it was upside down, down there. Cape Town and shopping, breakfast and lunch filled the day until we took the train to Miss Newell's college, Huguenot University College in Wellington, 45 miles away.

Wellington was attractive, with huge trees everywhere and the main street lined with stores and houses, most of them with balconies. Huguenot University College, where Miss Newell had been for two years, was on the edge of town in a campus with flowers and hedges and tall eucalyptus trees. It was founded many years ago by two women from Mt. Holyoke College of Massachusetts. Later it was incorporated with the University of South Africa, one of its five colleges in the Union of South Africa. The buildings were of brick brought over from America. One whole shipload was shipwrecked but later recovered and erected as planned. It was altogether a curious combination of a religious institution, a girls' college and a university. It was the first girls' college in the Union. The curriculum was prescribed by the University. The faculty was mostly American and British. I met the elderly President wearing her academic robe. We always knew, when we saw her walking the campus trailing long pieces of eucalyptus bark, that she was about to steam up her geyser (geezer) for hot water for a bath.

I spent the next weeks at the college in a daily routine that included tea at least three times a day, in weather varying from brilliant sunshine to chilly rains, expected in this fall season of the far south. Several delightful motor trips were offered me, the first one to nearby villages and towns through a succession of fine vineyards and orchards and acres of nursery trees, always in a big panorama with mountain ranges in the background changing color with the time of day.

One day I joined a botanical trip by truck (motor lorry) into the Drakensberg mountains not far away. A two-hour trip took us slowly up to Bains Kloof, with fine views all the way. Girl Guides met us and gave us tea in a cottage. I collected ants into small vials of alcohol, and someone gave me a frog. An academic evening followed after dinner, a paper presented by a faculty member; in the candle-lit drawing room decorated with chrysanthemums and a huge branch of brilliant poinsettias.

May 29

The first real collecting trip was to Saldana Bay in Southwest Africa on the Atlantic Ocean. We drove the 89 miles in a Buick car to the town of Langeban, stopping once in the rough desertlike country to make tea — with the local salty water! The fine clear day ended with a beautiful sunset and then many stars and a big planet over the bay and its small islands. We had rooms in a small boarding house which had a “stoep” (porch) where we could sit.

One day we had a short steamboat trip to a “whale factory”. The

stench was terrible and we left quickly. On the beach I collected limpets and snails from rocks and under bushes. Flamingoes were in the near distance.

We re-packed the car on the fifth day and returned to the college. Then my time was filled with developing films, boiling and cleaning shells, preserving large insects in alcohol, and labelling. I did a little collecting at a nearby reservoir and spent a long time preparing the skin of an owl, which had been an unwanted and unwelcome gift.

Miss Newell and I made two short trips to Cape Town for money and train tickets. She had planned my extensive collecting trip and I bought a book good for 6000 miles of train travel in the Union.

It was vacation time at the college when our group left Cape Town: Miss Newell and three other faculty members and myself. We embarked with stacks of luggage, which included a large basket with a bottle protruding. We would be four days on the way to the Victoria Falls. We left late in the afternoon, starting northward past pink-and-blue mountain ranges, often with snowy peaks alight in the gorgeous sunset.

The train went slowly, pottering through the countryside. There was never any hurry about reboarding after a short stroll in a station. It was a fairly comfortable car, not the ones on narrow two-foot rails which we encountered later. The compartments were small and one bought a bedroll good for the entire trip, in charge of the bed-boy. In the morning we were in dry bushy country with flat-topped small hills and two-foot termite hills of red earth. A geologist told us that there is so much iron in the ground that compasses are of no use, confused by so many signals. We lunched in the station at Kimberley beside a cosy coal grate fire. Soon more bushes appeared and small hills covered with low trees. We stopped often at small villages and towns. Very black Kaffirs (natives) often were waiting for the train with things to sell: carved wooden animals, giraffes, porcupine quills, crude pottery and fur blankets (karosses). The men wore miscellaneous clothing, gunny-sack or blankets. Often groups of small black people stood beside the train, their thin arms raised, begging for bread (bröd).

On the third day we unloaded at the junction city of Bulawayo and motored to the Carlton Hotel, where we had luxurious baths and breakfast. Later we boarded the train for Victoria Falls. The train was more modern, even elegant, and we had tea and dinner in the diner.

The next day native round huts with thatched roofs appeared, and corrals fenced with red mud or brush. Native families were sitting around their huts and the stations. Their skins were very black, even

their lips. Lone travellers were often to be seen on the road carrying on their heads or a stick everything needed for a long independent existence. They wore odds and ends for clothing, sometimes gold rings in their ears. Dome-shaped woollen caps seemed very popular, too.

July 2

After a long day on the train, we arrived at 6:30 of a chilly morning at Victoria Falls. After breakfast in the good hotel, we donned suitable regalia and went to the falls. Our path was in the rain forest across from the falls, where the Zambesi River drops from a mile-wide rock ridge into the narrow gorge with a continuous roar and rainbows forming in the heavy spray. The drop is about $2\frac{1}{2}$ times that of Niagara. We had fine views down into the gorge in spite of the spray and mists. A big baboon loped through the tropical undergrowth near us. We went back to the hotel, part way by "trolley"; a small car powered by three Kaffirs pushing us uphill and riding down.

After dinner we went up the Zambesi River by motorboat. Thick tropical undergrowth, sedges and palms lined the shores. We landed at an island and (of course) had tea. I collected snails from wet tropical leaves. On the return, crocodiles and hippos appeared near the shore.

After dinner native dancers performed, but I left early to attend to my collections.

The next day we walked across a long narrow bridge over the gorge and down a rough path to the edge of a pool below the falls. The tropical undergrowth was rich and tall palms rose from it. Monkeys with pale fur and black faces played in the treetops. A hot walk took us back to the trolley after I had collected snails and shells from the debris around the pool. The evening was filled with attending to collections and writing.

The next morning, after a golden sunrise seen through the mist, I collected along the river bank. A kind lady talked "kitchen Kaffir" to some small boys who could have caught frogs for me. But they went right on hilariously chasing a monkey through the trees and around the landing place. Later I packed and rested until early train time. A delicate new moon followed a vivid sunset.

We went again to Bulawayo and the Carlton Hotel, and by rickshaws to a small zoo where the chief attraction was a huge lion. Later we were invited by Judge Russell, to whom Miss Newell had letters, to have dinner with him at his house. His family were very cordial and the dinner delicious and elegant. We left after 10:00 to take the train for Ft. Victoria on our way to the great Zimbabwe Ruins.

We had a full day of travel ahead after leaving Bulawayo en route to Ft. Victoria. At first the landscape was grassy with sparse trees and many termite hills, changing then to groups of huge boulders, broad granite outcrops, euphorbias and red alces in bloom. At our frequent station stops, we saw picturesque natives, often carrying tall baskets on their heads. They wore few clothes, and wide bead rings around their necks, arms and ankles. They walked with a fine swinging rhythm, even the women with babies tied to their backs.

July 6

We finally reached Ft. Victoria after doing 123 miles in 9½ hours! The hotel was simple but good enough.

Five of us set off next day in a Ford driven by a Mr. Ball, to go to Zimbabwe. We had a punctured tire. Mr. Ball stuffed the casing with the old tube and a leopard skin and we soon bounced onward. The Ruins Hotel was an attractive assemblage of thatched huts of different sizes.

The early history of the Zimbabwe Ruins is not known. At first they were thought to be perhaps the remains of Ophir, source of the gold of King Solomon, but later the 13th or 14th century B.C. was thought more likely. Some gold beads and small flat pieces of gold have been found.

In our week at Zimbabwe, we visited various parts which have been named. The large Elliptical Temple is of massive stone walls put together without mortar. Inside, some parallel walls lead to the Conical Tower, its top crumbling. I collected ants and shot some lizards.

One day we climbed the Acropolis by the Ancient Ascent: up rough stone steps between narrowing walls, then between huge boulders to the top. Here, ruins of a temple or fort showed strange little narrow doors, labyrinthine passages, and walls with some monoliths remaining on top. The views over the valley were magnificent.

At night in my "rondavel" (hut), I heard continuous drumming in the cold quiet, a reminder that here the blacks outnumbered the whites about 1,000 to one.

Overnight took us again to Bulawayo, where we lunched and then motored to Rhodes' grave in the Matopos Hills. Lichens of beautiful colors covered the rocks, thickly branching euphorbias and tall aloes were everywhere. Bushman paintings could be seen in a cave nearby. Our evening train for Pretoria was jammed with people on a two-day holiday. At the following stations, natives sold eggs and bottles of milk

besides the usual things. It was very windy and dusty, grasshoppers in the air, the light glaring on the orange ground. Miss Newell and another faculty woman got off at Mafeking to return to Wellington and I went on alone for the rest of the trip.

July 14

After a short change at Johannesburg the train went on to Pretoria, then capital of the Union. I went to the Grand Hotel where a fire in the Writing Room helped thaw me out: it was **cold**.

The hotel maids had shiny oiled heads and wore for decoration long white bead ropes and colorful blankets. In the Writing Room, the Manager had tacked up a huge "reserved" sign for a lady interviewer, who asked for my Opinions of South Africa.

I had to go back to Johannesburg for a few hours on personal business connected with the death of my father in May, when I was already in South Africa. A young man in the American Embassy gave me a card to Dr. Cawston, in Durban, who would help me in collecting there.

From Pretoria, a short bus ride took me to the "Wonderboom", an enormous tree rising from many trunks. I found snails in a stream. A letter introduced me to Dr. Green, head of a large fine new laboratory nearby where sheep, horses and cattle were being treated for several prevalent diseases and serum was produced and sent out in quantities.

Another bus trip was to Hartebeeste Poort. My room was a rondavel (round hut) up against a mountainside, with a view of the lake above a dam. It was dry rocky ground. I found snails and a toad in the river below a dam and shot a small lizard. Later I collected bees and butterflies, aided by a small boy. The blue water and tan mountains were very lovely at sunset.

July 24

Another cold dusty bus trip took me from Pretoria to Johannesburg and the Langham Hotel. Miss Oloroyd, a friend of my stepmother, called on me and we spent a long delightful time in the fine zoo. Elegant lions roamed about or sunned themselves on brown and red rocks, while ring-tailed lemurs played in the trees in the large wooded area.

A letter from Dr. Green of Pretoria brought a Dr. Orenstein to see me. He was a distinguished American, chief of the Gold Mines medical staff. A delightful and charming person, he took me to tea and music at a Lounge and to the Carlton Hotel for coffee and liqueur. He planned several things for the following day.

But my plans were upset at this point by illness. The doctor sent for an ambulance to take me to a private nursing home. After two days, I was able to return to the hotel but did a good deal of resting. One evening a lively young American, Mr. Mott, who heard of me from Dr. Newell, took me to a lively play. On the sixth and last day in Johannesburg, I had a number of visitors, including a professor of Zoology and a Medical Researcher. A cordial and pleasant group of people saw me off at the station in the evening, bearing gifts.

August 1

From Johannesburg it was overnight and half a day to my next stop at Pietermaritzburg. Here my time was spent with Mr. H.C. Burnup, a longtime correspondent of Mr. Bryant Walker, Honorary Curator of my Division in the Museum in Ann Arbor. He was a Scotchman with a genial and humorous eye, a great walker, and a meticulous worker with shell collections, everything in place and neatly labelled. I was to see him again on a short stop after about a week in Durban. In the Museum I saw an exhibit of South African shells, and Mr. Burnup got out some shells for exchanging.

The Imperial Hotel dining room had Indian waiters, there was a great deal of scurrying to and fro, snapping of fingers, etc. Next day Mr. Burnup gave me more shells, and I spent time later packing and numbering 100 small boxes for shipping to Miss Newell.

Next day I had a delightful motor trip with friends I had met in Pretoria. We saw Howick Falls, which drops 200 feet into a steep-sided valley. Later I boarded a very late train for Durban. It was overloaded and had to be pushed piecemeal up steep grades. A soccer team from England was on board and filled the hotel in Durban, so I was transferred to the Federal Hotel about midnight.

August 3

In the morning I had a rickshaw boy take me around for several hours. He was very decorative with a ball of feathers and flowers and a cockade on his head, a white horsetail at the back of his neck and a springbok skin over his shoulders. I saw the Marine Parade and the beach and a huge steel grille in the ocean to protect swimmers from the undertow and sharks. A wind was coming up to a gale with sand blowing from dunes north of the esplanade. I went early to bed.

The Durban Museum was shown me by Mr. Chubb, the Curator. It was a part of the Town Hall Building. I went to the Botanical Gardens

and collected some shells. All the trees and flowers of Africa were new to me and such fine collections were a great pleasure to me.

Dr. and Mrs. Cawston, who had had a letter from Johannesburg introducing me, invited me for dinner and we planned collecting trips for the coming week-end. The first of these trips was an afternoon in Malvern, half an hour by train. At a boys' school the headmaster, who knew Dr. Cawston, gave us five boys to help. In a pool full of reeds and sticks, I collected many snails from this debris, and the boys were good at catching frogs. On a trip next day to Avoca, I found snails in pools among sugar cane and also in small dirty pools in a pasture. Donkeys and sheep were pasturing here, and Indian women, with clusters of gold beads in nostrils and rings on toes, were washing clothes, strapping them on stones in pools. A friend came later and, with the help of a reluctant boy clad in sacking, hauled up debris in which I found snails. In the evening, after dinner with the Cawstons, a Captain Digby came in and helped me pick specimens from the debris. Mrs. Cawston presented me with a child's armchair of wood decorated with a few dashes of black burns. Captain Digby carried it on the bus, but I took it outside the hotel to excuse him from having to take it inside. It was a conspicuous and awkward object.

Captain Digby took me next day to the Point on the beach. Natives and Indians were here in water up to their waists working to fasten a chain around the tail of a huge whale, while blood pumped from its wounds. Finally a winch and cable pulled the whale onto an iron car bound for a whale factory nearby. In the evening, a concert by the Town Band with Captain Digby ended this full day in a gorgeous sunset.

It rained almost all of the following day. Mr. Chubb at the Museum helped me select a boxful of papered butterflies and moths as a gift. In a visit to the big Indian market, I saw decorated snuff boxes for earlobes, horn snuff spoons, wildcat skins and exotic foods. Indian dancers were in the street, a large cobra head and four dancers leading.

August 12

In the morning I embarked for Pietermaritzburg. The hotel was filled with the soccer team, so I was taken to a small annex nearby. In the entrance hall, a glass jar of specimens fell and broke on the hard floor. Formalin and frogs and lizards were in the broken glass. I dashed off as soon as possible to the Museum. Mr. Burnup again picked out, labelled and numbered shells to add to his previous gift.

I spent most of the next day wrapping shells, a total of 207 lots from

Mr. Burnup. We were just in time for the train to Maseru. I still had the child's chair, plus five other pieces of hand luggage and two larger pieces in the baggage car. In the train next day I got rid of the chair by giving it to the steward. At last! The train was late and cold. A derailment ahead kept us standing, so I got off and picked up snails and waterbugs from a small ditch.

August 14

Maseru, in the Protectorate of Basutoland, was my next scheduled stop. The Stephens Hotel was a collection of rondavels of various sizes. Mine was large and very cold, but I could warm up in the sitting room by a fire. The Basutos were very picturesque, the women in many voluminous skirts, sometimes turbans, and in the mornings blankets folded over the shoulders.

I took several short walks, one to a hill where I found snails around aloes among the rocks. The view of the Caledon River and desert country was extensive and beautiful. In the evening I played bridge with an amusing group: a sporty old man, a large pompous impatient man, and the giddy young wife of a doctor. One day I had tea with a Mr. and Mrs. Gibson and enjoyed the blossoming almond trees along the way and in their garden. In the evening there was dancing in the hotel. Twelve couples included clerks from local stores, some very good dancers. It was fun.

The remaining days in Maseru were filled with short walks and with cleaning and preserving shells and lizards. Mimosa trees were in bloom and violets showed up in a park. In the town, in front of a store, were two natives making wire bracelets. They used a cow-horn to roll the wire onto a horsehair. At the Industrial School, I had a sturdy wooden chest made to contain much of my collection and strong enough for the trip back to Ann Arbor.

August 23

In the train for Bloemfontein, I was joined by a Miss Alexander, Head Nurse of the Johannesburg Hospital. At a station stop she helped locate lizards for me to shoot. She introduced me to the manager of Polley's Hotel in Bloemfontein before she left. In the evening I pickled the eight lizards I had shot.

At St. Michael's School I bought some Basuto pots. I walked back to Polley's Hotel with a basketful of pots carried by a small black boy.

At the hotel the Chief of Police called on me. He was a Canadian and asked me particularly how Prohibition was working in the States!

My five days in Bloemfontein were a very busy and fruitful time, due largely to the fine impression left by The University of Michigan Professor Dr. William J. Hussey, who had spent some months there helping erect a telescope. Everyone was cordial and helpful and generous with gifts to The University of Michigan.

I spent most of one day with Dr. and Mrs. Eybers. At late afternoon tea many guests were present, Dutch and "Pseudo-Americans" who conversed mostly in Afrikaans. But the earlier part of the day included a side-car trip to Gray University College, where the professor of Zoology presented me with mollusks, turtle shells and miscellaneous reptiles and amphibians he had collected.

Dr. Irving took me to his home, where I met his wife and babies. He gave me 25 butterflies from his fine and extensive collection. Dr. Irving also took me to the Museum, where I saw exhibits of fossils and many mounted animals. In an inner court tortoise shells were being stretched and dried. I met a number of people and was driven to the hill where Dr. Hussey set up the telescope. In town there was a monument commemorating the 26,000 Dutch women and children who died in British concentration camps during the bitter Boer War. A Dr. White, who had helped Dr. Hussey, drove me to Glen Agricultural College and presented me with four very showy insects.

An early start next morning would take me in 24 hours to East London on the Indian Ocean. I typed in my coupe on the train. In the country we passed through, gaunt poplars sent gray shadows over the sun-parched plains. The world stretched from yellow rocky hills dotted with dark bushes to flat-topped blue ridges beyond. A few lean horses cropped the dusty ground or rested, exhausted, lacking food and water. On the red domes of ant-heaps busy small birds perched, darted away, returned, feeding on insects that had withstood the icy nights and quivering heat of noon. In the afternoon the country showed many small yellow and purple flowers close to the ground, and a few scattered farms appeared. Green fields and sometimes very green willows were near a house or along a stream bed. Soon we were again in bleak country at the top of a long slow steep grade. In the night we would drop down again to reach East London on the Indian Ocean.

After an early morning arrival in East London and breakfast at the Marine Hotel, I walked to the beach. Pools among the rocks had algae and many mollusks, some of them under the rocks. I collected there again on several other days.

A group of Johannesburg acquaintances drove me to Leach's Bay. I

took rich debris from the sandy shore where partly submerged rocks broke the surf. Under a tree at the beach edge, the ground was covered with fine *Achatina* shells, like apples in our autumn orchards.

All of the next morning was spent in my room, boiling, pulling and pickling marine mollusks. Later the same friendly group of yesterday drove me to the Nahoon River where it meets the Indian Ocean. A walk to the top of sand dunes and over a bluff to a flat area gave me many specimens; bleached achatine shells were as thick as pebbles on a beach. It was hot but exciting.

I went to the town for more supplies, and boiled, preserved and packed all next day for early departure on the following morning for Grahamstown.

It was a 24-hour journey from East London to Grahamstown. At first the country was densely wooded, and the natives wore ochre-dyed clothes, circular skirts banded at the bottom with black, and had painted faces. Hedges appeared, of aloes, prickly pear or century plants, with euphorbias and thorn-trees here and there. Boys often ran along beside the train begging pennies or bread. We passed an ostrich farm, and I saw the awkward flight of a toucan. At a station I caught sight of a black boy in white shirt and trousers and a pink ruffle around his waist, and two other boys wore white ruffles and cerise toques with green bands and tassels.

In my room at the Carlton Hotel in Grahamstown next day I luxuriated with a fireplace.

Dr. J.E. Duerden called. He had been at The University of Michigan for a year, 1904-1905, and Miss Newell had written to him of my coming. We went to Rhodes College to see several scientists and, later, to the Albany Museum, where I met Mr. Hewitt, the Curator.

An evening with Dr. and Mrs. Duerden and graduate students was made festive by tea, wine and cakes.

At the Museum next day, Mr. Hewitt identified some of the frogs I had collected and we discussed exchanges of shells for reptiles and amphibians from Michigan. On another Museum morning I cleaned up some of the East London shells. It cleared after a rainy day and I walked with friends and enjoyed the masses of yellow acacias and the fragrance of blooming fruit trees and eucalyptus blossoms. Several short trips by Ford car and walks with friends netted me mollusks, a lizard, two geckos, two big green-knobbed locusts, ants and beetles. Good collecting spots were under rocks or in the humus in wooded areas at the top of hills or cliffs. Purple heather often bordered roads and views of the ocean rested the eyes.

My last day in Grahamstown was very full. I was shown a pottery and afterwards picked up shells. At the laboratory Dr. Duerden presented me with many reptiles and amphibians and reprints of his papers. After dinner with the Hewitts, we called on a kind elderly couple who had a large collection of shells made during 40 years in South Africa. I packed until very late.

A three-hour trip in the train next morning took me to Port Alfred. The country was lovely, with wooded dunes, sandy beach and the Kowie River. I picked up some flies for the chameleon I had brought from Grahamstown and caught other insects in the front yard of the small hotel. Several people called on me and I had tea with a group which included a jolly little minister and his silent wife.

Shelley Beach nearby gave me many mollusks from the rocks and pools above the foaming waves breaking from long rollers. On the hotel porch I worked on my catch.

On my last day in Port Alfred, I taxied up the Kowie River bank and collected from the shore and from pools. The evening was filled with preparing specimens and packing. The lamp gave out at 9:30, so I had only one candle. My tortoise was very restless in a canvas bag.

Early morning departure for Port Elizabeth had a two-hour stop at Grahamstown, where I shipped my chest to Miss Newell and saw several friends. I had morning tea with Mrs. Duerden, called on Mr. Hewitt, received a parcel of reptiles from Mr. Essex, and saw Miss Saunders and her father. The long trip continued, through bushy country, cliffs with caves, and euphorbia and aloes on the skyline.

We arrived in early evening at Port Elizabeth, where I had a good room with a view of the ocean at the Balmoral Hotel.

Two faculty women from a girls' collegiate school, Miss Austin and Miss Ruffel, took me to the Museum and to morning tea, and then to the Snake Park, a great tourist attraction. The walled enclosure had a moat around a grassy center for some smaller snakes. The attendant picks up a puff adder, opens its mouth and poison drips from the fangs. He wears heavy gloves and leather puttees. The poison is used to make serum against snake bite. In the afternoon I called on Mr. and Mrs. Cruden. Mr. Cruden is a teacher in a boys' school and a collector and specialist in trap-door spiders.

I took a bus to Humewood, where I found many shells in the debris under bushes on the sandy river beach. Later I went with the Crudens to Baakens River Valley with its fine cliffs and fields of yellow flowers in bloom. The stream and a pool yielded many freshwater snails.

The next day was cold, windy and rainy. Mr. Cruden brought me a skink and a snake. Another day with torrents of rain I went to town stores in search of paper, boxes, etc. I went alone to Humewood and collected many snails, out in the rain. After tea with the Crudens one morning, I was given shells from Jeffreys Bay.

A short taxi ride took me to a resort area where I found no shells but enjoyed seeing a spring-fed stretch of ground filled with Arum lilies. In the evening Miss Austin came with many pictures of Victoria Falls, and Mr. Cruden gave me trap-door spiders' nests, together with notes. Then packing occupied me until 1:00 A.M.

The narrow-gauge train for Jeffreys Bay left next morning. I had a struggle at the station, arranging to ship a large tin of preserved specimens and two tortoises via "Perishable Goods": The little train took on horses and goods vans en route. We made the long journey of 60 miles in seven hours, finally arriving an hour late at Jeffreys Bay where I took an auto to go to the Beach Hotel.

Collecting on the beach of this small town was very good and included ants and a burrowing snake found under a stone. In the hotel, the guests were mostly fat women doing handiwork. One woman said she had tried screening her windows but found it "too stuffy." Quantities of small shells were for sale on the beach next day by native women, and I found they were used in jug covers of net for weighting the edges. I bought some which included one good larger shell. In the evening, I worked in my room and packed for early departure in the morning.

Dr. and Mrs. Duerden were at the Port Elizabeth station when we arrived in early afternoon, with "tea in hand". They gave me a mixed lot of animals, including fairy shrimps and frogs as well as shells. Later I bought a wooden box from a Chevrolet agency. I packed until a lady in the next room asked me to "stop that knocking" (hammering).

In the morning I finished packing and sent off a box via Goods. The trip to George was through uninteresting country, but I shared a seat with the daughter of a missionary and we had very pleasant talk.

At George the slopes of mountains were covered with flowers, yellow and pink daisies, etc. An automobile from the town took us up steep grades and around curves, along Kaimans River to a grassy veldt on top. We were at "Fairy Knowe" in the section known as Wilderness, one of the most beautiful places along the shore, a great holiday resort. My room was a rondavel (hut) on the Touros River and it was "very elegant" according to my diary. I collected shells along the beach and in the bush, and ants and butterflies lower down. I climbed twice to the Kaimans

River road and the magnificent view of the Indian Ocean and shore. The upper part of the Touros River where fresh water comes in looked tropical with its dense vegetation, tall trees, flowering shrubs and trees and geraniums. Collecting was good.

An all-day excursion with other guests in a Ford motor lorry was slow going up to a mountain pass with mountain ranges on the horizon in sharp relief. We stopped for tea and for lunch and I did some climbing up a rocky cliff from which the view, even in the rain, was beautiful.

Other walks took me to busy fields where I scratched in the humus for snails, good fresh specimens of special interest. Several friends of Miss Newell called on me one evening and seemed to enjoy my exhibit of preserved snakes. My live chameleon was now quite tame and shot out his three-inch tongue for the flies I offered on forceps. He was now named Methuselah, "Thusie" for short, because of his ancient appearance: nubby rough skin, prehensile tail, hands and feet adapted for grasping, and protruding eyes skin-covered to the tip and able to move independently. His color varied to match the twig or leaf he was on and at night he was white. His shape changed quickly from leaf-like thinness to slightly rounder, a small crest standing up along his spine. I carried him in a small cheesecloth-covered box.

Miss Newell's friend, Mr. Grant, with his son Peter and a dog, called for me to drive to Plettenberg Bay. The grades up into kloofs and down again were terrific and the car broke a spring. It was very hot. We stopped for repairs at a town where there were rocky Heads at the mouth of a lovely river. We picked up a very stout lady and the Ford was in trouble. After a very steep hill we walked over sand and a bridge to the Islet Hotel on Plettenberg Bay. It had been a whaling station. The landlady and her sister were enthusiastic collectors of shells.

In a cold wind next day the genial gay cook dashed out at low tide and cut fine shells of *Haliotis* (small elongated abalones) and limpets from the rocks with his long knife. I dug clams in the sand flats along the river, and in the afternoon found tree snails on the wooded dunes. After dinner three other women and I sat outdoors in a slight drizzle and discussed Christian Science, glass eyes and false teeth.

One day at Plettenberg Bay, I joined a party for a drive starting with crossing the Keurboom River on a pontoon bridge run by hand power. Then down to the seashore, where huge yellow-wood trees stood, draped somberly in moss hanging from their branches. Then up again for a wide view of the lovely sea panorama. Near the river, on our return to the hotel, we passed trees loaded with masses of pink flowers, bush

daisies and lavender flowers. A brilliant sunset followed by a full moon ended a delightful day.

After some packing in the morning of my last day at the Bay, I joined three women for a drive but the car broke down very soon. With the help of a garage man and a car from a motor car agency we were able to get back to Wilderness. After dinner I did more packing and could enjoy again, from my window, the big moon across the river.

The train for Cape Town next morning had a coupe reserved for me alone, a real necessity to accommodate me and my 11 pieces of hand luggage.

Even before disembarking at Cape Town in the morning, I had letters and carnations from Miss Newell, who was in the midst of Examinations at the college. I went to the American Consulate to sign various papers, and to the museum. In late afternoon Miss Newell's friends, Dr. and Mrs. Lynott called for me at the Grand Hotel and drove me to their very pleasant house in Kenilworth, not far from Cape Town. I had a good rest for two days, and a fine drive to several small towns and to the splendid Kirstenbosch Gardens, where plantings of South African flowers, shrubs and trees included the unique Siverleaf trees, shimmering in the bright sunlight. In Cape Town we met Miss Newell at the Grand Hotel for tea and a lot of good talk on a balcony until supper-time, when Mrs. Lynott had to leave.

In the evening, Miss Newell and I went to the attractive Opera House to see "Trilby". A delightful new kind of Finale for a Collecting Trip!

Of course the real ending was not possible until all the boxes and parcels I had sent to Miss Newell in Wellington from time to time had been sorted, unpacked, and repacked for shipment to Ann Arbor. It was a long and arduous business, broken only by short excursions and slowed down for days by a stiff neck. It was not until November 22nd that I could leave South Africa.

I embarked on the S.S. Aeneas of the Blue Funnel Line, bound for Liverpool. My leave of absence had been extended, which allowed me to stay until late February with my step-mother and her sister at St. Jean-Cap Ferrat, where my father had died in May. I was back in Ann Arbor on March 2, 1925, almost a year from my departure on April 6, 1924.

The whole "Adventure" was the result of the initiative and unfailing help of Miss Anna Grace Newell. Her friends welcomed me cordially and helped in every way to make possible good collecting. She was a good friend and an enthusiastic, intelligent person.

TRAVELING ALONE THROUGH SOUTH AFRICA,
THE ADVENTURES OF A WOMAN ZOOLOGIST
FROM THE UNIVERSITY
DURING HER SEARCH FOR SPECIMENS¹

Leonard C. Hall

Women have assumed a position of increasing importance in the field of natural science during the past decade, but until very recently they have confined their activities largely to laboratory research and the collection of natural history specimens on a modest scale, admitting ambitious scientific expeditions to distant fields to be the exclusive domain of the male. Indication that the order changes is afforded in the successful completion recently of a 6000 mile single-handed collecting expedition, accomplished by Miss Mina L. Winslow, curator of molluscs in the Museum of Zoology of the University. Leaving Ann Arbor in April 1924, on a year's leave of absence, Miss Winslow devoted her six months stay in South Africa to the collection of zoological specimens for the Museum. Her particular interest lay in the accumulation of representative molluscan series, but through the cooperation of resident collectors and by individual effort Miss Winslow returned with a sizeable array of insects, reptiles, and amphibians in addition to many fine shell series.

On her journey to South Africa, Miss Winslow made a short stay in England, sailing from London on a Union-Castle steamer, touching at Las Palmas in the Canary Islands, Ascension Island, and St. Helena, arriving at Capetown May 19. At Wellington, fifty miles from Capetown, Miss Winslow met a friend, Dr. Anna G. Newell, a former faculty member of Smith College. Dr. Newell, who was senior lecturer in Zoology at Huguenot University college at Wellington, was able to provide Miss Winslow with letters of introduction to many resident scientists, who were of assistance in her work.

Her first trip on the continent was a railway journey of 1642 miles

¹This report appeared on April 5, 1925, in *The Michigan Daily*, the student-run newspaper of The University of Michigan. An essay on this trip written by Miss Winslow is in the preceding article (*Walkerana, Trans. POETS Soc., 1983, 1(5): 367-383*). A brief account of Miss Winslow's life appeared in *Malacological Review*, 1983, 16(1/2): 133-134. — EDS.

northward to the great Victoria Falls in Rhodesia. Miss Winslow combined business with pleasure, collecting many specimens of fresh water snails in the Zambesi River above the falls during a stay of several days. She also visited the Zimbabwe ruins, the truncated remains of a fortress, gold mine or temple recognized to be of great antiquity, its builders unknown. The fortress surmounts a low elevation near Victoria, South Rhodesia, constructed of hewn granite blocks placed together without mortar. Miss Winslow remarked that in the region about the Falls baboons slouch among the bushes and the monkeys chatter from the trees, both quite tame.

Returning southward to Mafeking in Bechuanaland, Miss Winslow entered upon the most strenuous period of her stay, beginning with the first leg of a collecting tour, which carried her back in an easy circle to Wellington. From Mafeking in the center of the continent, the naturalist worked eastward and southward by way of Pretoria, Johannesburg, Pietermaritzburg to Durban on the Indian Ocean. Collecting, and travelling by short stages, she worked along the edge of Basutoland, north to Bloemfontein, then eastward again, meeting the ocean at East London. Along the southern shore through Grahamstown, Port Alfred, Port Elizabeth, Jeffrey's Bay, George, and back to Wellington, completing the 6,000 mile circle.

Adding constantly to her stock of specimens through daily collecting trips, Miss Winslow often worked far into the night preparing them for transportation. She periodically mailed them in small boxes to her friend in Wellington, consolidating them later. Miss Winslow indicated that her time was fully occupied with meeting people, and with collecting and preparing specimens. Boiling and cleaning snails, drowning and preserving reptiles, papering insects and occasionally stuffing them with cotton consumed a large part of her time.

She found natives unreliable and of little assistance in collecting, only once employing a black boy to secure a number of razor-clams from the water-covered surface of a sandy beach. He secured them by letting down a wire into their pits, pulling them out when the shells closed upon it.

Final consolidation of the specimens in Wellington revealed to Miss Winslow that she had collected more than 200 species of reptiles and amphibians; an indeterminate number of shells, including many complete series showing age differences and endless color variations; a sizeable body of insects including many ants and butterflies; the whole filling six boxes, a chest and a trunk. Among the molluscs are a series of

land snails, as large as apples, which were picked up beneath the trees at the forest edge.

Of particular interest from the evolutionary standpoint are the four specimens of *Peripatus*, a many-legged animal measuring about two inches in length, that is supposed to be the link between the worms and insects, in the evolutionary series. Miss Winslow found them at the forest edge, near Grahamstown.

A young chameleon, now residing in the Zoology Museum as the pet of the staff, is perhaps one of the first of his kind to be brought alive to this country. Miss Winslow conveyed him, during the long journey to Ann Arbor, in a special carrying box. In cold weather a hot water bottle served in the absence of the African sun. The chameleon measures about seven inches and is two-thirds grown. In color he shows variations from pale green with white stripe, to dark green with lavender streakings. His outstanding characteristic rests in his eyes, which project from a position high on his head and work independently so that he can stare rearward along his spine with the right orb, and at the same time gaze fixidly at an approaching fly over his snout with the left. His food consists entirely of flies. When feeding time arrives Miss Winslow grasps a fly with a pair of forceps, holding the insect at a distance of three or four inches from the chameleon's mouth, he eyes it slowly swinging his head, and in a flash flicks it from the instrument with the tip of his tongue. The tongue will extend four inches upon occasion. Winslow also brought back alive a small South African land tortoise.

Much valuable assistance was given the zoologist during her stay by several scientists residing in the cities on her route, to most of whom she carried letters of introduction. Prof. J.E. Duerden, who was a member of the staff of the Zoology department of the University in 1905, now teaching in the Rhodes University College at Grahamstown, presented her with a valuable collection of reptiles and assisted in further collection. Miss Winslow also received 200 lots of named shells from Mr. H.C. Burnup of the Natal Museum at Pietermaritzburg. Some of the shells were cotypes named by or for Mr. Burnup himself.

A collection of nests of trap-door spiders was presented by Frank Cruden of Port Elizabeth. Mr. Cruden has made the collection of such nests his hobby and had arranged a comprehensive display of the architectural accomplishments of the spider. Among the nests given were some specimens with hinged doors weighted with mud, while others had a forked-tube entrance equipped with a web net which closes automatically behind the insect. Mr. Cruden accompanied the gift with a

series of notes on the habits of the spiders.

At Durban, Miss Winslow was assisted in her work by Dr. Gordon Cawston who has often collected freshwater snails for Dr. Bryant Walker of Detroit, honorary curator in the Museum of Zoology at the University. Dr. Cawston has been studying the *Bilharzia* parasite which affects man, and has as its intermediate host certain species of freshwater snails.

During her travelling about South Africa, Miss Winslow covered but a short distance by motor car although there are excellent roadways in some parts of the country, the reason being that gasoline sells for a dollar a gallon, and motor transportation therefore is expensive. There were few gas stations.

The large part of the 6,000 miles was accomplished on the railways, for which Miss Winslow had the highest praise. She indicated that they compare favorably with the American lines in all respects except speed. The trip of 1,642 miles from Capetown to Victoria Falls utilized three nights and two and one-half days. The slowest leg proved to be the 62 mile run between Jeffrey's Bay and Port Elizabeth, which consumed seven hours. Immediately upon her arrival at Capetown Miss Winslow purchased passage for 6,000 miles in the form of a composite ticket. The South African Railway provides a 20 per cent tourist reduction and allows unlimited stop-over privileges.

In Bloemfontein, the naturalist was interviewed by the Chief of Police, who desired a detailed account of the workings of prohibition in the States. South Africa is interested in the movement.

Completing preparations for shipment of her specimens Miss Winslow sailed from Capetown, touching at Liverpool, and arriving in Ann Arbor on the seventh day of March.

A PROSTATE POUCH IN *PSEUDOSUCCINEA COLUMELLA*
(BASOMMATOPHORA: LYMNAEIDAE)

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Male reproductive anatomy has been used in the taxonomy of lymnaeid snails for some time (e.g., Hubendick, 1951; Walter, 1968). The male reproductive system of *Pseudosuccinea columella* (Say) differs from most other lymnaeids in that it is very small in comparison to both its own female reproductive system and to the male system of most other species. It is composed of a simple, glandular, unfolded tube connecting between the carrefour region and the vas deferens. The vas deferens connects to a weakly developed penial complex. The degree of folding of the prostate has been considered to be an important character in lymnaeid taxonomy, and the unfolded condition found in *P. columella* has been suggested as being the primitive condition (Roszkowski, 1927; Hubendick, 1951).

MATERIALS AND METHODS

Pseudosuccinea columella were collected near Fannett, Jefferson County, Texas, U.S.A. A laboratory stock was established and observations were made on specimens from that colony. Paraffin sections of the reproductive tracts from two specimens were stained with hematoxylin-eosin. Dissections were made on menthol-relaxed, formalin-fixed specimens.

Voucher specimens are in the collections of the Mollusk Division, Museum of Zoology, The University of Michigan (UMMZ 250219).

RESULTS AND DISCUSSION

Paraffin sections and dissections showed the presence of a very small pouch near the apical end of the sperm duct (= upper prostate). The length of the pouch was approximately 0.3 mm. It appears as a small

diverticulum, embedded in connective tissue and attached laterally to the sperm duct, extending anteriorly. The attachment site of the pouch to the sperm duct is slightly anterior to the small duct connecting the sperm duct to the carrefour region (Fig. 1). The pouch is composed of a single layer of cells which do not contain secretion (Fig. 2).

Sperm were present in the prostate of one of the sectioned specimens. In this specimen, the pouch appeared to be enlarged when compared to that of the other sectioned specimen. Thus, although the male reproductive tract is very small, it appears to be functional. I also have observed *Pseudosuccinea columella* copulating in the laboratory. Roszkowski (1927) found sperm in the spermatheca of one specimen of *P. peregrina* (Clessin) from Brazil, indicating that copulation had occurred.

The histological structure of the pouch in *Pseudosuccinea columella* (similar to the pouch of *Stagnicola elodes* (Say) (Rudolph, 1983)) and its position (similar to North American members of *Stagnicola*) make it clear that the pouch of *P. columella* is a prostate pouch as defined by Walter (1961, 1969).

Walter has made the most extensive use of male reproductive anatomy in lymnaeids. The prostate pouch is an important character in his views on lymnaeid relationships. An evolutionary sequence (from primitive to advanced forms) based on morphological types of male reproductive anatomy was proposed by Walter (1968). The morphological types and the species representing them are 1) radicine ("Radix" (? = *Austropeplea ollula* (Gould))); 2) prostagnicoline (*Radix luteola* (Lamarck)); 3) primitive stagnicoline (*Stagnicola corvus* (Gmelin)); 4) intermediate stagnicoline ("*Lymnaea* sp." (from England)); 5) advanced stagnicoline ("*Lymnaea*" (= *Stagnicola*) "*catascopium* Say" (= *emarginata* Say)).

The primary anatomical changes which Walter has described in order to construct the scheme given above are "reduction of the ancestrally long and simple penis to an almost vestigial state, and its reevolution with acquisition of a penial knot and radial and other special musculature, as part of a copulatory holdfast mechanism; narrowing of the vagina proper, and its acquisition of a powerful sphincter, as part of that mechanism; loss and reevolution of the uterine caecum; enlargement, then reduction of the prostatic tract, its change from a unfolded to a multifolded condition, then reversion to the former condition, its sharp division into 2 "prostates"; and finally, rapid development of a prostate pouch" (Walter, 1968, p. 19).

Unfortunately, Walter never described the characteristics of each

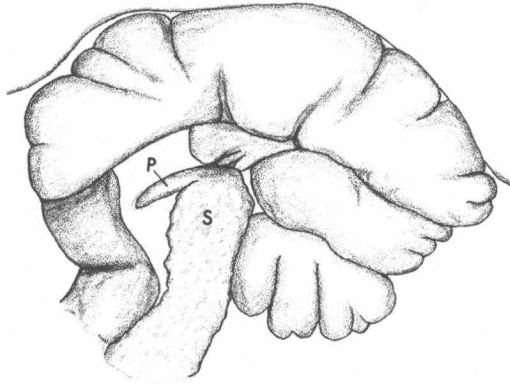


FIG. 1. The attachment of the prostate pouch (P) to the sperm duct (S) in *Pseudosuccinea columella*.

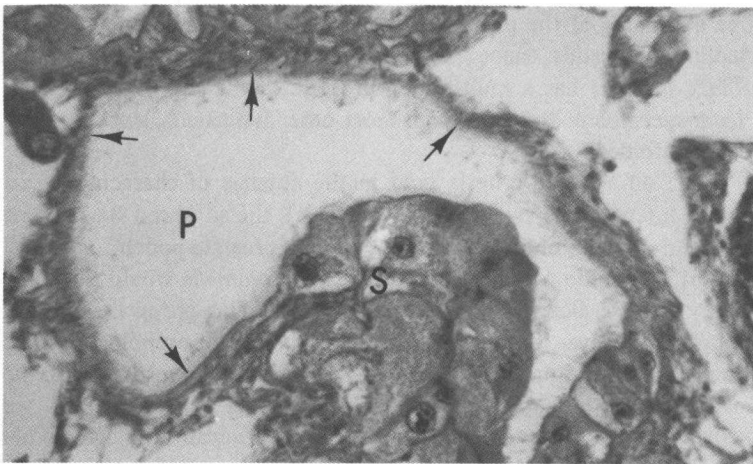


FIG. 2. Section of the prostate pouch (P) and sperm duct (S) of *Pseudosuccinea columella*. Arrows indicate the wall of the prostate pouch. Hematoxylin-eosin.

evolutionary category that he proposed. Neither did he give a species name for the representative of the intermediate stagnicolines nor names of other species which might be associated with it on an anatomical basis.

However, based on his extensive morphological data, he proposed close relationships between *Stagnicola corvus* and *Lymnaea stagnalis* (Linnaeus) (both with multifolded prostates); between *Radix ollula* and other *Radix* (except *R. luteola*); concluded that all North American species of *Stagnicola* are advanced stagnicoline and variants of *L. catascopium*; and that all generic and subgeneric subdivisions of the family Lymnaeidae were untenable and should be united under the generic name *Lymnaea* (Walter, 1968, 1969).

Walter (1961, 1968) clearly did not recognize the prostate pouch of *Pseudosuccinea columella*. He stated (Walter, 1968) that *P. columella* showed characters indicative of prostagnicoline affinities, as do *Fossaria*, *Bakerilymnaea* (= *Nasonia*), *Leptolimnaea* and *Bulimnea*. He did not state which characters these were, but, in the case of *Pseudosuccinea*, they would appear to be a lack of penial knot and vaginal sphincter, prostate not sharply divided into two parts and lack of prostate pouch. Walter did not appear to place much emphasis on the degree of folding of the prostate in allying those genera with the prostagnicoline lymnaeids, since the representative he gives for the group (*Radix luteola*) has a multifolded prostate, while the others do not. *Pseudosuccinea* is divergent from most other lymnaeids, since its prostate is unfolded.

Based on Walter's criteria (and in the absence of characters representing intermediate stagnicoline lymnaeids), the advanced stagnicoline lymnaeids are the only ones which possess a prostate pouch. The presence of a prostate pouch in *Pseudosuccinea columella* would thus tend to ally it more closely to the advanced stagnicoline group than Walter thought. However, it appears that this is the only morphological character it has in common with advanced stagnicoline lymnaeids, with the possible exception of the relative length of the penis (however, see below). *Pseudosuccinea* also differs from the advanced stagnicolines in possessing tricuspid first lateral teeth (Baker, 1928; Hubendick, 1951), whereas the first lateral radular teeth of advanced stagnicoline lymnaeids are bicuspid (Walter, 1961).

Walter did not specifically mention whether *Pseudosuccinea* possessed a uterine caecum, although he stated that it is almost universal in lymnaeids, but is lacking in the most primitive stagnicoline snails

(Walter, 1969). Dissections of the specimens in the present study showed a weak diverticulum at the position where the caecum is found in *Stagnicola*. This area appeared to be bounded on one side only by secretory cells when sectioned material was examined. In contrast, *Lymnaea stagnalis* (a primitive stagnicoline according to Walter's (1969) criteria) did not possess even a weak diverticulum when I dissected it for comparison. The possession of a uterine caecum (if it is indeed one in *Pseudosuccinea*), however, does not ally *Pseudosuccinea* any closer to *Stagnicola* than it does to the radicine *Radix*, since both genera possess one.

If *Pseudosuccinea* is to be placed into Walter's scheme, perhaps it would fit best into the intermediate stagnicoline category, based on its possession of a weakly developed prostate pouch and (possibly) weakly developed uterine caecum. Or, it really may be a primitive stagnicoline lymnaeid, in which case, re-working or abandonment of Walter's scheme might be necessary.

The latter may be preferable, since Burch & Lindsay (1968, 1973) have stated that the species groups (= genera or subgenera) *Lymnaea*, *Bulimnea*, *Fossaria*, *Pseudosuccinea*, *Radix*, *Stagnicola* and *Austropeplea* are immunologically distinct. In particular, *S. corvus*, *L. stagnalis* and *R. luteola* are immunologically and/or electrophoretically distinct from each other (although all have a multifolded prostate), while *S. corvus* and *S. elodes* are not distinct (*S. elodes* has a unfolded prostate) (Burch et al., 1971; Burch, 1973); *R. luteola* is not immunologically distinct from other species of *Radix* tested [*R. auricularia* (Linnaeus), *R. japonica* (Jay) and *R. natalensis* (Krauss), teste J.B. Burch] (Burch & LoVerde, 1973), but that *R. (? = A.) "volutata* Gould" from Hawaii [= introduced *ollula*, teste Burch] is immunologically distinct from these species of *Radix*, but not distinct from *R. (= A.) ollula* from Japan (Burch, 1968; Burch & Lindsay, 1968).

On these and other grounds, Burch et al. (1971) and Burch (1973) have suggested that reproductive anatomical similarities (e.g., *Stagnicola corvus* and *Lymnaea stagnalis*) may be the result of parallel evolution, since such similarities are not shown by the foot muscle proteins used for their immunological and electrophoretic studies.

The observations on *Pseudosuccinea* presented here tend to strengthen previous observations that morphological similarities are not always good indicators of close relationships within the Lymnaeidae, and that much more work, involving morphology, immunology, electrophoresis, chromosome cytology and other, newer methods of investigation, is necessary.

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SNAILS OF MEDICAL IMPORTANCE IN THAILAND*

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Thailand has one of the richest freshwater snail faunas in the world: 172 species are currently recognized, and another 96 species occur in brackish waters. These species are placed in 75 genera, 23 families and six orders. However, species that transmit human diseases, or are suspected to, are relatively few. At present, only 18 freshwater snail species are implicated or suspected in human disease transmission. These species are restricted to two orders and seven families. The parasites they transmit, all digenetic trematodes, are liver flukes (*Opisthorchis viverrini* (Poirier), *Fasciola hepatica* (Linnaeus)), lung flukes (*Paragonimus westermani* (Kerbert)), intestinal flukes (*Fasciolopsis buski* (Lankester), *Echinostoma ilocanum* (Garrison), *E. malayanum* (Leiper), *E. revolutum* (Froelich), *Hypodereum conoideum* (Bloch)) and blood flukes (*Schistosoma mekongi* Voge, Bruckner & Bruce).

In order to draw attention to the snails of known or suspected medical importance in Thailand, and to assist in their identification, we have prepared this brief review. The snails are presented below, with their presently known distributions and the parasites they transmit.

Snail hosts

Trematode parasites

Prosobranchia

VIVIPARIDAE

Filopaludina sumatrensis peninsularis Brandt⁽¹⁾

Bok Karani waterfall, Pang Nga Province, and a few other localities in southern Thailand.

Echinostomatidae

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Filopaludina sumatrensis polygramma (Martens)⁽¹⁾ Echinostomatidae
Central and southern Thailand. Also known from
Rangoon and southern Burma.

Filopaludina (Siamopaludina) martensi martensi Echinostomatidae
(Frauenfeld)⁽¹⁾
Throughout central and southern Thailand from
Chieng Mai Province to the Malaysian border.
Also found in Malaysia.

PILIDAE (Ampullariidae)

Pila ampullacea (Linnaeus)^(1,7) *Echinostoma*
Reported from all provinces except Mae Hongson. *ilocanum*
Also found in Laos, Cambodia, Vietnam, Malaysia,
Indonesia and Borneo. *Angiostrongylus*

Pila polita (Deshayes)⁽¹⁾ *Echinostoma*
Northern, northeastern and eastern provinces; rare *ilocanum*
in the south. Also found in Laos, Cambodia,
Vietnam, Burma, Malaysia and Indonesia.

BITHYNIIDAE

Bithynia (Digoniostoma) funiculata *Opisthorchis viverrini*
Walker^(1,2,7,10)
Northern provinces of Chieng Mai, Mae Hongson,
Tak, Lampun and Chieng Rai.

Bithynia (Digoniostoma) siamensis siamensis *Opisthorchis viverrini*
Lea^(1,2,7,10)
Widely distributed in Thailand. Also in Cambodia,
southern Vietnam and Burma.

Bithynia (Digoniostoma) siamensis goniomphalos *Opisthorchis viverrini*
(Morelet)^(1,2,7,10)
West of the Ping and Loei rivers and west of
Korat; north to Tonking.

POMATIOPSIDAE

? *Halewisia expansa* (Brandt)⁽⁴⁾ *Schistosoma mekongi*
Mekong River between Bandan in Thailand and
Sandan in northern Cambodia.

Tricula aperta (Temcharoen)^(3,5) *Schistosoma mekongi*
Mekong River from Ban Sabouxai, Savannakhet
Province, Laos, to Sompamit Falls near Ban Khon
near the Laos-Cambodia border, ? and to Kratie,
Cambodia; Mune River at Phibun Mangsahan,
Ubun Ratchathani Province, Thailand.

THIARIDAE

? *Brotia costula* (Rafinesque) *Paragonimus*
Widely distributed in northern India, Burma, *westermani*
Thailand, Laos, Cambodia and possibly Hainan.

? Brotia pseudoasperata Brandt

San and Huai Kao Man rivers. Also known from Annam and northern Laos, and probably has an even wider distribution.

Tarebia granifera (Lamarck)⁽¹⁾

Found in nearly all provinces of Thailand. Widely distributed in Sri Lanka, India, Southeast Asia, southern China, Indonesia, the Philippines, and islands of the western Pacific.

Pulmonata**LYMNAEIDAE***Radix rubiginosa* (Michelin)^(1,7,8)

Throughout Thailand except for the northernmost provinces. Also known from Laos, Cambodia, Vietnam, Malaysia and Indonesia.

Radix swinhoei (Adams)⁽¹⁾

Northernmost parts of the provinces of Mae Hongson, Chiang Mai, Nan and Chiang Rai. Also known from Taiwan, and reported from northern Burma, Laos, China and Japan.

Austropeplea ollula (Gould)⁽¹⁾

Thonburi, Bangkok, Mae Hongson, Chiang Mai and Nan provinces. Also China, Taiwan, Japan and Hawaii (introduced), and reported from northern India, Burma, Malaysia, Indonesia and the Philippines.

PLANORBIDAE**Gyraulus convexiusculus* (Hutton)^(1,7,8)

Common throughout Thailand. Widely distributed throughout South, Southeast and East Asia.

Indoplanorbis exustus (Deshayes)^(7,8)

Throughout non-mountainous provinces of Thailand. Widely distributed from India and Sri Lanka through much of Southeast Asia and introduced into Java, Celebes, the Philippines, Japan and Hawaii.

Polypylis hemisphaerula (Benson)^(1,6,7)

Found sporadically throughout Thailand. Also known from Laos, Cambodia, southern China, Taiwan and the Ryu Kyu Islands.

Polypylis (Trochorbis) trochoideus (Benson)^(1,6,7)

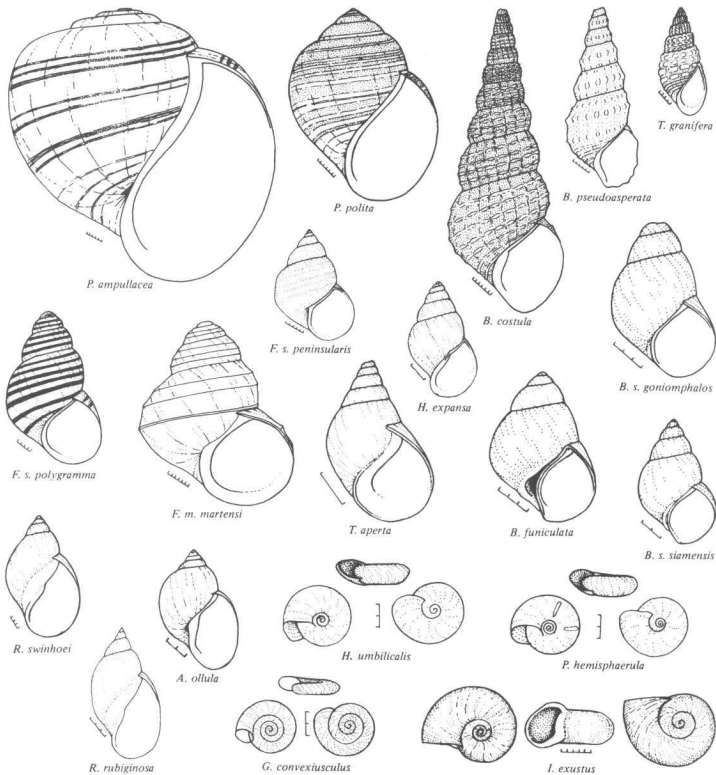
Widely distributed in South and Southeast Asia.

*Paragonimus westermani**Paragonimus westermani**Fasciola hepatica*,
Echinostoma malayanum, *E. revolutum*,
*Hypodereum conoidium**Fasciola hepatica*,
Echinostomatidae*Fasciola hepatica*,
Echinostomatidae*Echinostoma ilocanum*, *E. malayanum**Echinostoma malayanum*, *E. revolutum*,
*Hypodereum conoidium**Fasciolopsis buski**Fasciolopsis buski*

*A fourth species, *Helicorbis umbilicalis* (Benson), also may be involved in transmission of echinostomes and *Fasciolopsis buski*⁽¹⁾.

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Medically important snails of Thailand. Measurement lines in mm.