Ferning in Trinidad

by John T. Michel

Imagine yourself in a comfortable plantation house set in the heart of a tropical rain forest, a twenty-minute drive from the nearest settlement, all the people about you interested in natural history. You lounge in a screened veranda watching the honey-creeper pecking the fresh mango in the bird-feeder while the blue-gray tanager and frillicolous euphonia tear the berries from the surrounding shrubbery; seven-chamber-billed toucans hop the high branches of a far tree, and cordon-bleu spread their brilliant golden-tail feathers as they coast from perch to neighboring tree. (Nearly a hundred species of birds can be seen without leaving the porch.) The citrus, cacao, and coffee trees have seen better days, and although they are still bearing, the natural forest is inexorably encroaching to reclaim its heritage.

The groundcover is mostly ferns—six species of maidenhairs are captivating with their bright pink juvenile fronds; Tectaria incisa and several Thelypteris species rise four feet in the air; the roadbank is a mat of two filmy ferns (Trichomanes plumatum and T. cripsum), with Blechnum occidentale, Lindonea lancea, and L. strick- ta taking over in places. Spikemosses fern terrestial mats (S. diffusa, S. muscosa) or stand up to a meter tall (S. placa) to soak your legs with the fresh rainwater. Silver-back ferns (Pityrogramma calomelanos) lurk among the rocks, while Ctenitis proteana, Danna nodosa, Diplazium crizaumatum are common nearer the streams. The strawberry fern (Nephthisia palma) covers a roadside rock with its star-shaped fronds and its network pattern of sporangia follows the veins. Fronds 8-10 feet long are borne on tree ferns of various sizes: Cuculada spectac- hilis with trunks 6 feet tall and its subangular arterlike sawing machine stichery, and the more slender trunks of the spiny tree fern (Cyathea microdon) bearing fronds with needle-like spines along the stipe and rachises. Disturbed banks and abandoned fields are soon covered with the forking ferns (Dicksonia squarrosa, Gleichenia bifida, G. remotia) to form a sea of light green, forking fronds.

The ground is home to only half the fern species here. Some start on the ground and have the rhizome grow straight up the trunk (Polystichum oseumaceae) or leave the rhizomes on the ground and unfurl twining fronds onto the shrubbery (Lycopodium venustum, L. volubile) or even up into the higher trees (Calliopodium salicifolium).

The branches of the cacao trees are coated with the resurrection fern (Polypodium polypodioides) and its relatives, the vine ferns (Pleopeltis revoluta, Micro- gramna lycopodioides), strap ferns (Campyloneuron phyllis- ting, Niphidium crassifolium), and golden polypody (Phlebodium aureum). Occasionally an epiphytic club moss (Lycopodium dichotomum, L. limifolium, L. taxifolium) can be seen hanging from a branch. The shoestring fern (Vittaria lineata) is among the most unfurlife ferns, spread as a tuft of strings dangling from the branch. The vase-like crown of the American bird’s-nest fern (Asplenium serpentaria) perches on the larger trees, while other spleenworts (A. sursum, A. salicifolium) arise from the mosses. The padlike fronds of several Bla- phomis ferns, can be seen with their glossy, dark, leathery vegetative fronds and sporangia-speared black lower surfaces of the fertile fronds. Crouched among the mosses and easily passed over are the miniature, polypo- dilike Grammitis and linear Cochliidium.

A sudden light shower (or heavy cloudburst) may hasten the emergence of your raincoat, but after several offs and ons you agree that an umbrella is more handy, or even just getting wet is more comfortable than the cold, clammy inside of the raincoat.

You woke in the morning to the sharp "chuck, chuck" of the silver-beaked tanager, the whirring of hummingbird wings, and what sounds like the creaking of giant bamboo rubbing against one another (the guttural voice of the oropendola). A hearty breakfast promptly at 7 allows you a full day of botanizing, birding, and/or relaxing.

The house itself is surrounded by cultivated flower- ring shrubs, orchids, torch ginger, and ferns. On and banks by the front door of the house are seen the cordate prothallia and small fernlings of several fern species.

Other than the driveway (itself with 40 species of ferns), trails go in two directions - up and down - with 100 fern species within a half hour walking radius. You go down through the grapefruit orchard by an Adiantum-lined trail into the forest (too dark for photos without flash). You stop by the trail and stomp to see the "munakin lek", a patch of ground picked clean by the small, chickadee-like white-bearded munakin, where the males dance about incessantly to attract the females. You continue down a rocky but moderate trail to a steep-walled caiman, dripping with a lettuce-like filmy fern (Trichomanes nanum) and a pendent spikemoss (Selaginella hartii). The stream banks are laden with the diminutive fronds of Bolbitis heudeloti, whose pinmate sterile fronds each bear a bud or piantlet at a pine bough, and the fertile fronds tower over the stilt with their undersides black with a solid mass of sporangia. (It was previously known only from Trinidad and northern Venezuela but has recently been discovered in southern Mexico, a curiously disjunct distribution!) Into the caiman you go, wading ankle-deep in the stream to find the nests of the famous oilbird, or guacharo, a relative of the whip-poor-will and nighthawk, which eats palm fruits on its nightly forays rather than insects. This is the
most accessible oilbird colony in the world. The nests are high up in the darker recesses of the cliffs, and the number of nesting pairs varies from a few to thirty at any one time.

Following along the stream you encounter several quite different forms of filmy ferns. Most are epiphytic, the most conspicuous being Trichomanes polydoides, which forms large stands coating the trunks of tree ferns. Leme conspicuus is the terrestrial, rosette-forming L. communis with its strongly dimorphic fronds. Most striking is the largest of the Trinidad filmy ferns, Trichomanes elegans, which is terrestrial and reaches two feet in height. It appears quite unnatural with its bright blue-gray fronds, dark green color, and thick, almost plastic texture. The sori are borne in trumpet-like structures, each with a long protruding hair, on the lower surface and held at right angles to the blade, giving a very bristly feel to it. (One way has suggested that this makes it a real 'feel-me fern'.)

Many of the trees are intersected by the 4-inch wide highways of leaf-cutting ants, carrying green sails to their subterranean gardens. Land crabs scuttle backwards into their holes. The bellbird is frequently heard—sounding like the sharp twang of a large rubber band—but rarely seen. The three-foot-long pendent oropendola nests way in the tall trees, and other exotic birds, such as the blue-crowned motmot and violentos trogon, are occasionally seen. On the ground you may encounter the giant toad (Bufo marinus), an exceptionally ugly brute with a body eight inches long.

You are not bothered by many mosquitoes or other insects. Chiggers are a problem, but daily precautions of spraying and tucking pants inside socks reduce the threat.

To relax at the end of the day, you may take a swim in a real gem of a swimming hole in the midst of the forest, complete with waterfall and encompanied by ferns, flowers, and bamboo.

A preprandial rum punch each evening at 6 helps a general unwinding of the day, and evening tasks are given by class members and staff on their special interests, some on ferns and some not.

Not all of your field trips are close by. Taxi and vans take you to the freshwater Nariva swamp along the east coast, literally just across the road from the ocean. In this area of cultivated fields (an area called “Melon Patch”) four genera of water ferns can be found growing together—Calla palustris, Salvinia auriculata, Salvinia incrassata, and Ottelia. Lunch along the long, sandy, coconut-lined beach culminates in the splitting open of coconut and par-taking of the sweet, fresh meat.

A highlight of any trip to Trinidad is a visit to the salt-water Caroni Swamp on the west end of the island. There are few ferns, but the abundant and varied plant and animal life of the mangrove thickets is impressive. You are slowly boated through the canals among the mangrove and jutting trees with the shore birds, clapper rails, herons and egrets. The guide ties the boat to a post sticking out of the water and you wait. About 5 p.m. four scarlet ibises arrive. In a few minutes seven more coast in to roost. Then wave after wave of 10-30 birds make their appearance after a day of feeding, each wave stirring up the perching birds. They gradually settle down until the island looks like a Christmas tree with bright red decorations. You stay until nearly dark and you wonder how the guide can find his way among the innumerable canals to return to the dock.

 Trinidad has no high mountains; the three highest peaks are Arima (3085 ft), Tocouche (2072 ft), and Basse Basse (2761). Cloud forests on their tops clothe their trunks with mosses and epiphytic ferns— filmy ferns,

Lycopodium, Polyodinum, Lycodium, Diplomodea, Vittaria, Antrophyum. A terrestrial filmy fern, Trichomanes pillipum, has hair-like teeth ending in gnawers that appear on short strings of green heads. These fall off and develop directly into gametophytes. Quite a few ferns can develop spores directly from gametophytes, but not many do it the other way around. Another unusual fern to be found at the higher elevations in a form of walking fern, Asplenium acclinatum, a platy species with long, naked fronds that develop a baby when it touches the ground.

Horse ileu is within walking distance of your home, and Aripo is readily accessible, but the real challenge is Touche, which requires a guide and a long hiking day since it is a five-hour hike to the top and the trail has many branches. A view from the top reveals the north shore beaches and the string of peaks of the Northern Range.

Unlike most of the West Indies, limestone is uncommon on the Trinidad. Where it is encountered you find some of the speleomorphs, such as Asplenium cristatum, A. lacunum, and the very rare A. barbaeccina, and the large Cicropia adiantifolia.

On one rain morning you visit the Arapo Savanna, which in some ways resembles the pine barrens of New Jersey. It is a large, grassy expanse with big drooping bush and thickets. In the distance the slight rise reveals Schizaea punctata and Lycopodium peristalium, relatives of the pine barrens’ curly-grass fern (Schizaea punctata) and slender club moss (Lycopodium carolinense).

To cap off your stay in this part of the Caribbean, you take the 20-minute flight to Tobago. You find the nearer, southwestern end well provided with many hotels and fine beaches. Glass-bottomed boats take you over Buccoo Reef to see the coral, and snorkeling allows you to see the brightly-colored fish up close. Unfortunately, this end of the island is much cut-off and natural vegetation is lacking. However, the northeastern end is more secluded and the dense, wet forest of a national forest covers the nearby ridge. Two days here to study the ferns and another day at the bird haven of Arnica Vale, mixed with swimming and relaxing, before you return to the real world.

This is the fern workshop of the Asa Wright Nature Centre, located in the center of the northern mountain range in Trinidad, a three and a half hour flight from New York. Twenty people took advantage of a tropical fern course in the last summer (seating 200 of the island’s 300 species; twenty more will go in 1985 (July 9-23). For course reservations and details of the Centre, contact Caligo Ventures, 405 Greenwich Ave, Greenwich, CT 06830 (phone (203) 235-8221 or in Connecticut: 203) 082-8999. For fern details, contact John Nickle, New York Botanical Garden, Bronx, NY 10458. The class will be full (last year by March), so make reservations early. (The Centre is available also for groups or individuals at all times of the year.)
The book Ferns and Fern Allies of Chihuahua, Mexico by Knobloch and Correll is still available at the University of Texas' Dallas Bookstore, Box 686, Richardson, TX 75080. Total price to individuals is $22.93 and to bookstores is $17.14. Orders should be sent to the address in Texas above, marked "Attention Robert Neath". Prices include postage, insurance, and taxes.

Professor Knobloch, who is now retired from Michigan State University, receives no monetary remuneration for this book.

Survival Battle For Tiny Fern

A tiny fern, discovered only two years ago, is struggling to survive on the Poor Knights Islands, a new survey has found.

The fern, which has no common name, is fighting for its existence on a few rocky bluffs on the two main islands in the rugged Poor Knights group.

Six scientists from the Offshore Islands Research Group recently spent five fruitless days searching for the plant on Anorangi Island and now believe the fern is much rarer than was first thought.

A few plants had earlier been found on Tawhitirahi, the outer large island.

The Auckland War Memorial Museum botanist Mr. Anthony Wright said the fern, Asplenium pauperequium, was locked in a battle with nature.

"There is very little we can do unless we try to cultivate it," Mr. Wright said.

But because the fern was discovered only in 1982, very little was known about it and far more research was needed before artificial cultivation could begin.

Mr. Wright said the Poor Knights, a group of 13 relatively undisturbed volcanic islands 20 kilometres off the Whangarei coast, had many rare plants and animals whose survival was on a knife-edge. "The islands are relics of what New Zealand was like before the advent of man."

Unusual seabirds and rare insects nest in its towering cliffs and scurry through its primitive bush.

They are not threatened by such mainland dangers as dogs, cats or rats.

The Poor Knights -- under the control of the Hauraki Gulf Maritime Park Board -- are considered possibly the most important of the offshore islands in the region.

The board's policy is to keep people away from the Poor Knights, allowing rare plants and animals a better chance of survival.

Reprinted from the New Zealand Herald of September 17, 1984.
Propagation

John Streams, Ithaca, New York, writes:

"Solid chunks of fern root (tree fern fiber) sitting in a little water under plastic cocktail glasses are good for germinating spores. Later, slice off the little ferns with fingernail shears. If there are some fernlets you can't safely remove, put the entire remaining chunk, about two and one-half inches. As a contrast, sporophytes grown on soil are closer, but stronger on tree fern fiber.

"The medium can be baked twice to be pasteurized thoroughly, one-half hour each time, leaving it in the oven and cooling in between."

Thanks for the TIP, John Streams.

More About Mulching

Mulching for sicker winter weather never seems to be done right for all of the ferns all of the time. Last winter after an unseasonably warm February, the temperatures fell for a time into the teens and in a particularly wet part of the garden, several of the fern roots so that by spring they were heaved right out of the ground. As soon as it was possible, I reset them and they lived but were so damaged and reseeded in their growth that by the end of the growing season they were just getting started again as small ferns. Those ferns in the drier part of the garden benefited from the blanket of small branches and twigs mixed with pine needles, covered with maple leaves, and that is how I will do it again and hope for the best.

Pumice For Pots

Norman Hill, from "Down under," Otokohanga, New Zealand, writes:

"Pumice may be found in many parts of the North Island of New Zealand where there is, or has been, volcanic activity. It is usually in the form of rounded pieces of various sizes and, because it floats, is often found on beaches.

"Some months ago I gathered some pieces, each a little larger than a loaf of bread, with the thought that they could be made into containers for growing ferns. I used an old knife to hollow each block and packed a mixture of garden soil, sand, and compost. Blechnum fluviatile, Pellaea rotundifolia, Pteris ensiformis 'Victorian' were planted in the containers which were then placed in bright light in a warm room which receives some early morning sun. The response was most gratifying, with each fern making vigorous growth. In particular, Blechnum fluviatile grew into a handsome specimen. The rugged appearance of the containers definitely enhances their beauty. The porous rock allows an interchange of air which undoubtedly benefits the plants but evaporation is greater and watering must be more frequent.

"Fern lovers in volcanic areas will be amply repaid if they use pumice for pots but they should be made aware of one pitfall — pumice is abrasive and soon takes the shine off polished tables!"

You certainly are doing something right. The constant feeding method, which maybe you are using, cuts down on the chore of fertilizing, and the steady flow of nutrients with each watering means steady growth.

I use this method entirely with all greenhouse and indoor plants in all kinds of pots and potting mixes, especially soilless mixes. In the New York area, Peters’ Soluble Plant Food is widely known and used at the recommended rate of one-fourth teaspoon to one gallon of warm or room-temperature water to prevent possible leaf spotting from cold water. I fill a five-gallon container with warm water and measure out and mix in one and one-fourth teaspoons of soluble fertilizer and don't have the bother of measuring each time.

More about containers later.

Thank you for the TIP, Norman Hill.

Send your TIPS, QUESTIONS AND SUGGESTIONS to Eth Williams, 57 Clinton St., White Plains, N.Y. 10603

pH

A note on pH. — It is well-known that most ferns grow in a neutral or acidic soil with a pH of 7 or less, and that this information is important to their successful cultivation. During a three year stint in the Andreas del Rio district in western Chihuahua, Mexico, I was able to make preliminary readings of the pH with the aid of a LaMotte Soil Test Kit. Since some of these species have never been "read," I offer the results here:

<table>
<thead>
<tr>
<th>Species</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asplenium exiguum</td>
<td>5.0</td>
</tr>
<tr>
<td>A. monanthos</td>
<td>7.0</td>
</tr>
<tr>
<td>A. radiatus</td>
<td>6.0</td>
</tr>
<tr>
<td>Bommeria hispida</td>
<td>7.0-8.0</td>
</tr>
<tr>
<td>Cheilanthes albomarginata</td>
<td>5.0</td>
</tr>
<tr>
<td>C. montevidensis</td>
<td>4.0-7.0</td>
</tr>
<tr>
<td>C. bonariensis</td>
<td>4.0</td>
</tr>
<tr>
<td>C. eatonii</td>
<td>7.0</td>
</tr>
<tr>
<td>C. farinosa</td>
<td>7.0</td>
</tr>
<tr>
<td>C. hirsuta</td>
<td>7.0</td>
</tr>
<tr>
<td>C. kaulfussii</td>
<td>7.0</td>
</tr>
<tr>
<td>C. lentigera</td>
<td>7.0</td>
</tr>
<tr>
<td>C. linchoii</td>
<td>7.0</td>
</tr>
<tr>
<td>C. (Notholepis) limitana var. mexicana</td>
<td>7.0</td>
</tr>
<tr>
<td>C. (Notholepis) sinuata</td>
<td>7.0</td>
</tr>
<tr>
<td>C. tomentosa</td>
<td>5.0</td>
</tr>
<tr>
<td>C. widthii</td>
<td>7.0-8.0</td>
</tr>
<tr>
<td>Druoperis pataula var. rossii</td>
<td>7.0</td>
</tr>
<tr>
<td>Elaphoglossum pilosum</td>
<td>5.0</td>
</tr>
<tr>
<td>Elaphidium procumbens</td>
<td>5.0</td>
</tr>
<tr>
<td>Elaphoglossum pilosum</td>
<td>4.0</td>
</tr>
<tr>
<td>Pellaea ovata</td>
<td>4.0</td>
</tr>
<tr>
<td>P. ternifolia</td>
<td>4.0</td>
</tr>
<tr>
<td>Polypodium aureum</td>
<td>4.0</td>
</tr>
<tr>
<td>P. guttata</td>
<td>4.0</td>
</tr>
<tr>
<td>P. hartwegianum</td>
<td>4.0</td>
</tr>
<tr>
<td>P. polylepis</td>
<td>7.0</td>
</tr>
<tr>
<td>P. polypodiodes var. aciculata</td>
<td>7.0</td>
</tr>
<tr>
<td>F. thysanolepis</td>
<td>6.0</td>
</tr>
<tr>
<td>Pteridium aquilinum var. pubescens</td>
<td>4.0</td>
</tr>
<tr>
<td>Selaginella pallescens</td>
<td>7.0</td>
</tr>
<tr>
<td>S. ripocaula</td>
<td>8.0</td>
</tr>
<tr>
<td>S. widthii</td>
<td>7.0</td>
</tr>
<tr>
<td>Thelypteris pteropus var. sonorensis</td>
<td>7.0</td>
</tr>
<tr>
<td>Woodsia mexicana</td>
<td>7.0</td>
</tr>
</tbody>
</table>
Eastern Chihuahua is underlain by Cretaceous limestone, shale, and sandstone, while the mountainous western part has the sedimentary rocks mostly covered with igneous and andesite and rhyolite. Thus, it is possible to have both acidophiles and calcicophiles in the region studied.

Irving W. Knoblock
130 Tulip Tree
E. Lansing, MI 48823

Southeastern Fern Conference
Field Trip

The Southeastern Fern Conference is held annually; this year it was at Highfield, North Carolina, 21-23 September. The region of southwestern North Carolina has spectacular scenery, with a rich fern flora. The conference was held at the Mountain, a center run by the United Methodist Church with conference facilities, good food, and a fine view from the lodge porch.

An all-day field trip was held on Friday, 21 September. Meetings were held on Saturday, and a short field trip on Sunday morning. In addition, there were field trips and tours of the area. Several tours were led by local botanists, and a number of the species found here were seen by all attendees. The area is rich in species and provides a good opportunity for those interested in ferns and other vegetation.

The all-day field trip, the main subject of this report, was led by Dan Pitillo and Herb Wagner. About 24 people attended, representing most of the Southeastern states plus Michigan and Pennsylvania. We managed to condense into five cars and two vans, which made for more conversation, as well as easier parking.

The first stop was at the high cliffs of the Cullasaja River. Dry falls is a term for a waterfall (which is) dry, usually from an overhanging cliff, so that one can walk behind the falls and remain relatively dry. The forest along the river was a number of typical woodland ferns such as Polystichum acrostichoides, Polypodium virginianum, Athyrium filix-femina, etc. The ferns grew on the cliffs near the falls. The real treat, however, were the stream ferns, growing by way in the dark crevice behind the falls. Flashlight and head lamp were necessary to see them, as well as crawling on one’s belly, but it was well worth the effort. Four kinds were found here: Vittaria, Trichomanes, Hymenophyllum, and Grammitis imbricata. All reproduce by spore and, except for Grammitis which occasionally produces spermatophores, were found here only as gametophytes.

The second stop involved hiking through a pasture to a small mountain stream and scrambling up to a falls. In the pasture Botrychium dissectum was abundant, with a few plants of A. alabamense (B. Jerman). A surprise find was a small colony of Lycopodium palustre in open woods. The rich forest along the stream (Crow Creek) contained the usual woodland ferns, including Cystopteris prostrata, Trichomanes hexagonopteris, and others. On rocks near the stream were Asplenium rhizophyllum, A. trichomanes, and A. resiliens. Trichomanes hochstetteri was the natural attraction; a small colony occurred far under overhanging rocks near the falls.

After lunch at various "fast food" stops in Franklin, we drove about 16 miles (unless you missed the turn, in which case it was more) to a brushy wet bog called White Oak Bottoms, where we found large plants of Isoetes angustifolia (one plant had leaves 55 cm long), Dicranum scoparium, Dicranella, and Thelypteris palustris, among other things.

We then drove for 12 miles over a humpy forest service road. Most of us, including the drivers, have no idea what occurred on this road since it was too dusty to see, but the first car reported rich forest and numerous flowering plants. This finally brought us into the Parks Walks Gorge, where we stopped to see ferns on the cliffs and many limestone boulders. Some of the more adventurous climbed up the slopes, others packed around in the forest. Several limestome ferns were here, including Cystopteris lutescens, Asplenium rhizophyllum, Athyrium penicillatum, and Asplenium resiliens. We looked for Cystopteris tennesseensis, but without success.

We returned through Franklin to Highlands and the Mountain for a well-deserved dinner and an interesting discussion of "Recent Developments in Pteridology" by Dr. W.B. Wagner, Jr.

James D. Montgomery
Ichthyological Associates, Inc.
Berkley, PA 19313

Request for Research Material

David G. Putnam, Department of Biological Sciences, Portsmouth Polytechnic, King Henry I Street, Portsmouth, PO1 2BP, England, would appreciate receiving fertile material, especially living, of Asplenium section Angula for a taxonomic evaluation. He would like material from throughout its range but particularly from South America and Europe.

Swedish Fern Society

The first number of the Bulletin of the Fern Club of Göteborg was issued in April of 1944. The society is for both amateur and professional botanists and foreign members are welcome. For further information write to:

Suzanne Roth-Tedersjö
Department of Botany
University of Göteborg
Carl Skottsberg Sata, 22
5413 19 Göteborg
Sweden

Annual Meetings

The annual meetings of the American Fern Society and the Botanical Society of America will be held from August 11 - 13, 1980 at the University of Florida, Gainesville, Florida. Those members of the American Fern Society wishing to present a paper or poster, and who have not received an abstract form, may obtain forms from the program chairman of the Pteridological Section of the Botanical Society of America:

Dr. Christopher Kaufler
Department of Botany
University of Kansas
Lawrence, KS 66045
Dues Are Due!

1985 dues and subscription payments are now due. If you owe for 1985, you received a dues notice with your ballot last November. Members who have not paid their 1985 dues will receive a FINAL NOTICE in February, and this newsletter will be the last publication to be sent to those who fail to respond with payment. Check your records now and send your dues to the Records Treasurer:

Dr. David S. Barrington
Fringe Herbarium
Department of Botany
University of Vermont
Burlington, VT 05405-0086

New Records Treasurer

For all of those who have not read the dues reminder in the left hand column, the society has a new records treasurer, Dr. David S. Barrington. Please address all inquiries concerning dues, changes of address, and applications for membership to Dr. Barrington. Claims for lost numbers of Fiddlehead Forum should be sent to:

Dr. James Montgomery
Ichthyological Associates, Inc.
Berwick, PA 18603

This will facilitate the processing of such claims as the editors must forward those sent to them.

Comments

Finally, the editors wish to thank all of those who contributed to our efforts to produce the Fiddlehead Forum for this our first year at the helm. We have learned much and hope that this experience will help us in the future to maintain the standard set by John Nickle in his ten years as editor. A special thanks goes to Edgar Poulton for his patience and understanding in our freshman year. Without his assistance, production of this volume would have been less than desirable. Ed is now retiring after eleven years as art director. The society does indeed owe a special thanks to him for his contributions over the years. We still hope to see his puzzle contributions in forthcoming issues.