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ANNUAL DUES 1990

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Volume 21
March 1990
Number 1

SSAR BUSINESS

SSAR MEETS AT FIRST WORLD CONGRESS OF HERPETOLOGY

The 32nd Annual Meeting of the Society for the Study of Amphibians and Reptiles was held jointly with the First World Congress of Herpetology (FWCH), 11-19 September 1989, on the campus of the University of Kent in Canterbury, United Kingdom. Nearly 1400 persons, representing some 61 countries (see chart), attended this largest and most diverse meeting of herpetologists ever held. The Herpetologists’ League and Societas Europaea Herpetologica also met officially at the congress, which was co-hosted by the British Herpetological Society, Fauna and Flora Preservation Society, and the Zoological Society of London. Thirty leading national and international herpetological societies supported the congress as Affiliated Organizations.

The complexities of such a large meeting were enormous—with nearly 50 symposia, workshops, roundtables, exhibits, and other events and with numerous nationalities and languages represented—yet all was effectively managed by Ian R. Swingland, Conference Director, and the UK National Executive. Kraig Adler served as chairman of the Scientific Program Committee. Many features of the congress were familiar to regular attendees of SSAR meetings in North America, since several of the Society’s traditional events were incorporated into the program.

World Congress of Herpetology (WCH), the parent organization which initiated and coordinated the First Congress, had its genesis in 1982, on the occasion of SSAR’s 25th Annual Meeting in Raleigh, North Carolina, USA (see Herp Review, 13:103, 1982). At that anniversary meeting, an ad hoc committee made the proposal and representatives of the world’s major herpetological societies decided to establish the WCH and elected Kraig Adler, then the President of SSAR, as Secretary-General.

Since that time, the WCH organization has been firmly established, operating funds raised, a constitution written, and meeting plans laid which culminated in the historic inaugural congress last September. Because of the enormous enthusiasm displayed at Canterbury, a Second Congress is now being planned, to be held in four or five years.

Canterbury and the University of Kent

The cathedral city of Canterbury, renowned the world over, is one of Europe’s most ancient cities and a settlement has existed on the site since the Stone Age. In 43 A.D. the Romans founded a village of wooden huts there and called it “Durovernum,” remains of which can still be seen in the city. The ancient Norman fortress walls, gate towers, and timbered buildings—all clustered around the magnificent cathedral, the Mother Church of England—preserve much of a medieval atmosphere, and congress delegates were able to stroll through the city’s narrow, sometimes still cobbled streets. Canterbury also has rich literary associations, being the city of Chaucer, Christopher Marlowe, Charles Dickens, and Somerset Maugham, and it is one of the most visited places in the UK.

The University of Kent, on the other hand, is one of England’s newest institutions, founded by Royal Charter in 1965. It occupies a 300-acre campus on a magnificent hillside overlooking the city from the north. Except for the plenary lectures, which were presented at the Marlowe Theater in the city, all other congress events were held on campus. Herpetological activities totally occupied the campus and the official WCH logo was everywhere to be seen. The logo (above) is from Conrad Gessner’s Historia Animalium (Zürich, 1554), a chameleon perched precariously “out on a limb,” as indeed the WCH felt itself to be in its early years!

Registration was conducted in the Senate, a centrally-located building, and most delegates roomed in one of two

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<th>Country</th>
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Total attendance included 900 delegates, 316 accompanying persons, and 152 others (honorary officers, special guests, press officials, and others involved in the congress).
residential colleges (Eliot and Rutherford), each a confusing stereoisomeric image of the other. Each college had a dining hall for meals as well as a bar, in which many lively discussions took place each evening. Two unique brands of beer—"Herpetology Ale" and "Tortoise Bitters"—were brewed specially for the congress, with souvenir bottles conveniently placed in each delegate's room! The self-contained nature of the campus, conveniently placed in each delegate's room! Meeting of SSAR Board of Directors

The SSAR Board met from 1000 to 1630 h on 11 September in the Grimond Lecture Theater (this being one of the shortest board meetings in recent memory!). President Henri Seibert opened the meeting by announcing that Juterbock had agreed to resign the post. Ernest Liner agreed to serve out Juterbock's unexpired board term, since one individual cannot hold two voting positions on the Board of Directors.

Treasurer Douglas Taylor announced that membership was down slightly from last year, probably a result of the dues increase, but SSAR is in better financial shape. Publications Secretary Robert Aldridge announced that more than 60,000 pounds of SSAR publications are now in storage at St. Louis University. Discussion centered on membership drives and publication sales (both anticipated in 1990).

Committee reports were mostly uneventful, although there was some discussion about the role of the Conservation Committee and the current paucity of future meeting sites. After significant and sometimes spirited discussion, a budget of $126,000 was approved for 1990; this included the establishment of an Emergency and Special Projects Fund.

SSAR Business Meeting

President Seibert called the meeting to order at 1930 h on 14 September in Grimond Lecture Theater. Secretary Juterbock reported the highlights of the Board meeting of three days before and Treasurer Taylor reported financial matters (see above). Chairperson James Murphy presented the slate of nominees for the autumn election on behalf of the Nominating Committee. The slate was accepted by unanimous vote. Harold Dundee reported on the 1990 meeting in New Orleans, leaving many to wonder if there would be time for business in between all of the eating and partying!

Martin Rosenberg, on behalf of the Resolutions Committee, presented the following resolutions:

* Whereas, James S. Jacob has served as Secretary of SSAR for the past eight years; and

* Whereas, he has performed said secretarial duties with great efficiency; and

* Whereas, his efforts have greatly enhanced communication between and among officers, committees, and members, Therefore, be it resolved that the Society extend its deepest gratitude to James S. Jacob for his many years of service to the Society.

* Whereas, Rodolfo Ruibal has served most ably as editor of the Society's scientific journal for seven years; and

* Whereas, the Journal of Herpetology has achieved a high level of preeminence during his tenure as editor; and,

* Whereas, his efforts have promoted the distribution and sharing of knowledge and discovery among colleagues throughout the world, Therefore, be it resolved that the Society recognize Rodolfo Ruibal's invaluable and excellent service to the Society as Editor of the Journal.

* Whereas, Herpetological Circulars are major publications of the Society; and

* Whereas, these publications are highly valued by the herpetological community; and,

* Whereas, Neil Ford has ably served as editor of this series for the past six years; Therefore, be it resolved that the SSAR express its gratitude to Neil Ford for bringing six Herpetological Circulars to publication during his tenure as Editor.

* Whereas, WCH Secretary-General Kraig Adler, PWCH Conference Director Ian R. Swingland, and WCH Treasurer Marinus S. Hoogmoed have devoted thousands of hours over the past half decade toward the organization of this meeting; and,

* Whereas, this First Congress represents an historic gathering of scientists from 61 countries; and,

* Whereas, this congress has set a high standard of excellence in all respects; Therefore, be it resolved that Kraig Adler, Ian R. Swingland and Marinus S. Hoogmoed be duly thanked for their successful efforts.

Letter of greetings from His Royal Highness Prince Philip, Duke of Edinburgh, K.G., K.T., the official Patron of the First World Congress of Herpetology.
Whereas, the WCH Executive Committee.

Whereas, the excellent performances by the English and Scottish dancers and the bagpipe music at the Westgate Gardens provided delegates and guests with an appreciation for the long history and great traditions of the United Kingdom; and,

Whereas, the University of Kent at Canterbury has provided outstanding facilities for the exchange of scientific information; and,

Whereas, the organizers of the FWCH have worked for many years in planning this inaugural world congress; Therefore, be it resolved that SSAR acknowledge the support and contributions of the following: His Royal Highness Prince Philip; Councillor A. G. Porter, Lord Mayor of the City of Canterbury; David J. E. Ingram, Vice-Chancellor, University of Kent; and the dozens of additional individuals who worked tirelessly to make this meeting a pleasant and effective one.*

The resolutions were overwhelmingly accepted by an animated vote of the membership.

Finally, Henri Seibert passed the SSAR gavel, richly carved with herpetological motifs, to President-elect William Brown, who adjourned the meeting at 2020 h.

Student Travel Committee

Several years ago, SSAR, together with the Herpetologists’ League and the American Society of Ichthyologists and Herpetologists, established a committee to raise funds to send North American graduate students to the congress. Auctions and other events were conducted to collect funds, including a raffle organized by Ronald Alig and Linda Trueb. The committee (David Cundall, chair; Ronald Alig, John E. Cadle, George C. Gorman, Dale R. Jackson, Linda Trueb, and R. Wayne Van Devender) eventually provided substantial travel grants totaling $4500 to eight persons. SSAR is grateful to the people who successfully organized this program.

Opening Ceremonies

In plenary session at the Marlowe Theater, the First Congress was formally opened by the Secretary-General, Kraig Adler. He noted the historic occasion of herpetology’s first truly international congress with its dual themes of science and conservation, and he greeted the delegates on behalf of the WCH Executive Committee.

Ian R. Swingland, Conference Director, extended a welcome on behalf of the Secretariat and the UK National Executive, followed by remarks from David J. E. Ingram, Vice-Chancellor and administrative head of the University of Kent, our official host institution. A group photograph of the delegates was taken that morning on the steps of the Marlowe.

Honorary Officers

At the request of the Secretary-General, the Earl of Cranbrook, a prominent British zoologist, invited a distinguished group of the United Kingdom’s leading naturalists and public figures to serve as honorary officers for the First Congress, to demonstrate the widespread support for the congress in Great Britain and to make its planning activities more visible.

H.R.H. Prince Philip, Duke of Edinburgh, K.G., K.T., President of the World Wide Fund for Nature (WWF; formerly called World Wildlife Fund) and a leader in international conservation, consented to be the official Patron of the First Congress. Prof. Angus d’A. Bellairs, the eminent British anatomist and herpetologist, served as Honorary President.

Among the 23 Honorary Vice Presidents were the Most Rev. Robert Rundle, Lord Archbishop of Canterbury and Primate of the Anglican Church; the President of the Zoological Society of London, Sir William Henderson; several leading naturalists and conservationists including, in addition to Lord Cranbrook himself, Sir David Attenborough, Prof. J. L. Clulow-Thompson, Mr. Gerald Durrell, Dr. J. F. Deryk Frazer, the Countess of Huntingdon, the Viscount Massereene and Ferrard, the Baroness Nicoll, the Hon. Miroslav Rothschild, the late Sir Peter Scott, and Sir William Wilkison; the Director of the British Museum (Nat. Hist.), Dr. R. H. Hedley; Prof. Sir Richard Southwood, Vice-Chancellor of the University of Oxford; Prof. R. J. Berry, President of the Linnean Society of London; and the Rt. Hon. Robin Leigh-Pemberton, Governor of the Bank of England and Lord-Lieutenant of Kent, in which county the congress was held.

Plenary Speakers

In order to highlight some of the most important current areas of research and conservation of amphibians and reptiles, several individuals were invited to present 50-minute plenary lectures at the Marlowe Theater, on the first and last days of the congress. They were introduced by noted personalities associated with the congress:

- Carl Gans (USA): The State of Herpetology. Introduced by Angus d’A. Bellairs, Honorary President of the First Congress.
- Armand de Ricqles (France): Paleoherpology. Introduced by Ulrich Joger, General Secretary of Societas Europaea Herpetologica.
- S. Donald Bradshaw (Australia): Ecophysiology of Desert Reptiles. Introduced by Roger A. Avery, Chairman, UK National Executive for the First Congress.
- Eric R. Pianka (USA): Community Ecology. Introduced by Henri C. Seibert, President of SSAR.

All of these lectures and the Opening and Closing ceremonies were recorded by O.E.D. Recording Services Ltd. (46

*Whereas, the FWCH has been successfully conducted within the beautiful and historic city of Canterbury; and,
Complete sets of the 11 tapes are available from Q.E.D. for £60 (approximately $100) postpaid worldwide; payments can be made by VISA, MasterCard, or Amex. Individual cassettes are also available; address inquiries to Q.E.D. The plenary lectures will be published as a single volume; details to be announced later in Herp Review. It is also planned to produce a videotape summary of the congress; details will be announced later.

Symposia

A main feature of the congress were 27 symposia, covering an extremely broad range of topics; several symposia will be published. Roger Thorpe served as Symposia Manager. Each event was arranged by two conveners who usually also served as moderators; additional moderators occasionally participated. Most were half-day events, but a few (marked *) covered a full day. In the following listing, all authors of a given paper are given; this list differs from the Program in some instances, but reflects the papers actually presented in Canterbury.


- Sexual Selection and Communication in Amphibians and Reptiles. Murray J. Littlejohn and Stevan J. Arnold, conveners. A. Arak; D. Crews; M. L. Dyson; H. C. Gerhardt; L. D. Houck; P. M. Narins; N. I. Passmore; P. J. Bishop; and M. L. Dyson; M. J. Ryan, A. S. Rand, and W. Wilczynski; P. Verrell; K. D. Wells and T. L. Talgen; B. D. Woodward.

- Environmental Sex Determination. Claude Pleau and Nicholas Moscovsky, conveners. J. W. Bickham; C. Dournon; M. W. J. Ferguson, D. C. Deeming, P. T. Sharpe, E. Vallyey, and A.
conveners. N. B. Ananjeva and S. Shammakov; J. Bernardo; C. M. Bull and I. Williamson; J. D. Congdon; C. P. Cummins; M. L. Crump; K. Y. Lue and K. S. Chung; L. Schwarzkopf; R. Seigel, R. Shine and L. J. Vitt; B. Sinervo; P. Sjögren; J. J. Law.


Ecology and Conservation of the Tuatara. Michael B. Thompson and Donald G. Newman, conveners; Marie-Charlotte Saint Girons, moderator. C. Gillingham; B. Green; L. J. Guillette and A. Cree; M. McIntyre; D. G. New.

Charlotte Saint Girons, moderator. C. Gillingham; B. Green; L. J. Guillette and A. Cree; M. McIntyre; D. G. Newman; G. C. Packard, M. B. Thompson, and M. J. Packard; M. B. Thompson.


- Medical and Herpetological Aspects of Venomous and Skin Toxins. José M. Cei and Sherman A. Minton, conveners. G. De Caro; D. L. Hardy; E. Kochva; D. M. Mebs; H. Rosenberg; D. A. Warrell; J. Wright.


- Field Methods and Biotelemetry. Jan van Gelder and R. Stuart Mackay, conveners. J.-P. Gasc; J. J. van Gelder; K. Grossenbacher; R. S. Mackay; J. P. Martinez-Rica; G. Nauleau; J. J. G. Howard; A. Mariani; T. Pilorge and J. Cogert; R. Podloucky; M. Sander.

- Molecular Techniques. David M. Hills and Craig Moritz, conveners. L. D. Densmore; S. D. Kain; and R. T. Purrack; D. M. Hills; L. R. Maxson; C. Moritz; R. Murphy; J. Sites and R. Murphy.

Posters

Many delegates participated in the congress by bringing posters describing their research. 370 posters were erected. Special times were set aside when authors were present at their posters to conduct discussions. Richard Tinkley served as Posters Manager.


Seal engraved by Hajime Fukuda, Past President of Herpetological Society of Japan, to commemorate the First Congress. The Chinese characters read (right to left) "snake" and "propensity"—or "snake mania"—in allusion to herpetologists' devotion to their discipline and to the fact that the congress was held, appropriately enough, in the Chinese Year of the Snake. The seal is written in the Japanese Ten style of 1000-500 B.C.
Other Events and Presentations

In addition to the main scientific program described above, there were numerous other events. The IUCN Species Survival Commission, chaired by George B. Rabb, met at the congress, as did several of its specialist groups concerning reptiles. A meeting of the African Amphibian Group was arranged by Jay M. Savage. A Herpetological Quiz, covering world herpetology and including laboratory displays, was organized by Martha Crump and assisted by Garth Underwood.

An auction of donated herpetological materials (books, prints, original artwork, paraphernalia), organized by Michael Lambert, was held one evening before a large, "spirited" audience. About $4000 was raised by Joseph T. Collins, the auctioneer, and his assistants, Ruth Zantzinger and Ellin Beltz; the proceeds will support worthy amphibian and reptilian conservation projects, worldwide.

A two-hour-long Herpetological Audiovisual Extravaganza was held, consisting of three sound-and-slide programs which required six computer-controlled slide projectors and a 4-by-10-m screen. "Herpetology Past and Present," an hour-long presentation by David M. Dennis and Kraig Adler, featured photos of herpetologists, their institutions, and illustrations of amphibians and reptiles from earliest times to the present, accompanied by classical and modern music, and was international in coverage.

Two shorter AV programs by Dennis and J. Eric Juterbock, "Amphibians of the Appalachians" and "Herpetology of the American West," comprised photos of animals and their habitats, accompanied respectively by the music of Aaron Copeland and Igor Stravinsky, and included breathtaking full-screen panoramas of some of the most famous herpetological localities and North American scenery. These three programs, officially sponsored by SSAR, were shown a total of seven times, by popular demand, and were described by members of the French contingent as "formidable!"

There were a large number of commercial exhibits, arranged by Thomas E. S. Langton, including book and print dealers, publishers, conservation displays, and herpetological society membership booths. In addition, numerous congress memorabilia were produced for sale, such as men's ties, crystal paperweights, medallions, and T-shirts decorated with the congress chameleon logo.

The congress Press Office, staffed by two persons, provided regular reports to television and print media of the most important research and conservation news from the congress.

Publications

Each delegate received several congress publications, including a 110-page Program. The 334-page Abstracts volume, containing half-page summaries of each oral and poster presentation, was organized by Tim Halliday. Unfortunately, no extra copies are available for sale.) Delegates also received a specially-bound congress edition of SSAR's latest book, Contributions to the History of Herpetology, by Kraig Adler, John S. Applegarth, and Ronald Altig, as a gift from the Society.

WCH Executive and Business Meetings

The Executive Committee of the World Congress met four times during the congress and the Business Meeting attracted about 200 delegates. Business included ratification of the WCH Constitution, endorsement of WCH's continuing editorial responsibility for the series Amphibian and Reptilian Species of the World, establishment of a Committee on Nomenclature to respond to requests from the International Commission on Zoological Nomenclature, election of new members to the Executive and International Herpetological Committees (EC and IHC) of WCH, passage of resolutions, and discussion of a venue for the Second Congress.

After discussion at the Business Meeting, the new Constitution was approved unanimously. Among other provisions, this affords a mechanism for election of new EC and IHC members.

The Executive Committee of the World Congress of Herpetology, in session at Canterbury. Left to right, seated: Michael R. K. Lambert (UK), Marinus S. Hoogmoed (Treasurer; Netherlands), P. E. Vanzolini (Brazil); standing: Gustavo Casas-Andreu (Mexico), Robert L. Carroll (Canada), Ermí Zhao (China), Ilya S. Darevsky (USSR), Rainer Günther (German D.R.), Donald G. Broadley (Zimbabwe), Harold G. Cogger (Australia), Kraig Adler (Secretary-General; USA), Ian R. Swingland (Ex officio; UK), and Hubert Saint Girons (France). Also present but not pictured: José M. Cei (Argentina/Portugal) and David B. Wake (USA).
Social Activities

Social activities were held every evening during the conference, to give relief from the intensive daytime scientific sessions and to provide other opportunities for interaction and discussion. The Lord Mayor of Canterbury and the City Council hosted an elaborate reception at the old Westgate Gardens in the city, at which we were entertained by the Canterbury Pipe Band, a highland bagpipe band dressed in full Scottish regalia, and two local troupes, including Morris dancers, demonstrating traditional English country dances. Other evenings featured a discothèque, receptions (the wine was excellent), and film programs.

The WCH banquet was a formal affair, with music by Dixieland and jazz bands, at which the congress hosted the Lord Mayor, the Sheriff of Canterbury, the university's Vice-Chancellor, and other Canterbury and university dignitaries. As was fitting for an occasion of this nature in the United Kingdom, the Secretary-General, on behalf of the delegates, led the formal tribute—called the “loyal toast”—to Her Majesty Queen Elizabeth II.

One day midway through the meeting was free of all scientific sessions, allowing delegates and families to relax or participate in guided tours to London, Paris, and other places, although tours were also conducted on other days. Some delegates visited Down House, home of Charles Darwin, now a museum just a short distance west of Canterbury.

On the final evening of the congress there was an enormous outdoor barbecue on a hill overlooking the city, where delegates and their families ate pork ribs and chicken ad libitum, washed down with another special congress brew, “Snake Bitters.” The 70-member Regimental Band of the Royal Green Jackets, a regular British Army unit stationed near Canterbury, displayed the famed pagentry of the British military by playing martial music while marching in several drill formations to entertain the audience.

On other evenings there were numerous informal gatherings of groups of herpetologists, some of which had never met before as a group (for example, herpetologists from the Soviet Union and China, who met for the first time in a group from throughout Latin America) and, in other cases, national groups (Canada, New Zealand, etc.) and groups with taxonomic or functional areas in common.

Closing Ceremonies

On the last day, following the final plenary lectures at the Marlowe Theater downtown, the First Congress was brought to a formal close by Kraig Adler. He noted the intensity of the week’s activities, the evident enthusiasm for the new Congress, and the presence in the audience of numerous senior colleagues from around the world as well as many young herpetologists, the youngest of whom was a 15-year-old amateur from Ohio in the USA.

As examples of the eagerness to attend this congress, Adler mentioned one delegate who sold his automobile to obtain the necessary funds, and another who borrowed from friends and relatives overseas and who expects that it will take 10 years to repay the loans. He then called on Michael Lambert, authorized by the WCH Executive Committee to read out the following resolution of appreciation:

*Recognizing the contribution made in convening the two World Congress committees (the Executive Committee and International Herpetological Committee) and by integrating the interests of the entire herpetological community with those in the United Kingdom for the First World Congress of Herpetology, and the dedication and personal commitment of the Secretary-General on behalf of herpetology and herpetologists worldwide, the profound thanks of the Congress participants are due to Kraig Adler.*

Harp Review 21(1), 1990
Acknowledging the assistance in the development and functions of the World Congress of Herpetology, the Executive Committee, on behalf of the world's herpetologists, wish to express their gratitude to:

1. William Duelman, David Wake, and John Wright, members of an original ad hoc committee which initiated the founding of the World Congress and put the proposal to American and foreign representatives attending the Silver Anniversary Meeting of the Society for the Study of Amphibians and Reptiles and of the Herpetologists' League in Raleigh, North Carolina, August 1982.


3. Members of the First World Congress Subsidy Panel: Marinus Hoogmoed (Chairman), Roger Avery, Wolfgang Böhme, John Burton, Carl Gans, Harold Cogger, Michael Lambert, Raymond Laurent, and Jay Savage.

Recognizing the value of the work put into developing and maintaining the smooth running of the First Congress, the Executive Committee, on behalf of the participants, have very great pleasure in expressing their deepest gratitude to all those people in the United Kingdom involved with administering the First World Congress of Herpetology, especially: Ian Swingland (Conference Director), together with Fiona Lawson, alias Mrs. Ian Swingland (Records Manager), without whose phenomenal and stalwart efforts the First World Congress of Herpetology might not have happened at all, as well as the following persons:

- David Bateman (Database Manager), Richard Griffiths (Stewards Manager), the Earl of Cranbrook (Convener of Honorary Officers), Roger Avery (Chairman, UK National Executive), Roger Thorpe (Symposia Executive), Richard Tinsley (Posters Manager), Timothy Halliday (Abstracts Manager), HenryArnold (Films Manager), Trevor Beebee (Workshops and Roundtables Manager), Michael Lambert (Auction Manager), Garth Underwood (Quiz Manager), and the Senior Stewards: Quantin Blosam, Arnold Cooke, John Cooper, Keith Corbett, Peter Davies, Brian Groombridge, Thomas Langton, Robert Oldham, Peter Olney and David Stubbs.

At the University of Kent: David Ingram (Vice-Chancellor), Peter Jordan (Conference Officer), Elizabeth Cable (Deputy Conference Officer), Neville Holloway (Catering Manager), and John Pelt (Audio-Visual Aids Manager). In the City of Canterbury: Arthur G. Porter (Lord Mayor of Canterbury) and William Preston (Secretary, Canterbury City Council).


Some accompanying persons, to assist needy overseas delegates, became booksellers, namely Dolores Adler and Patricia Zug.

Numerous other individuals and organizations have contributed towards the organization of the First World Congress of Herpetology in a variety of ways, and the Executive Committee take this opportunity to thank them also. These include: Martha Crump (Herpetology Quiz originator), Joseph Collins (auctioneer), assisted by Ruth Zantzinger and Ellin Beltz, David M. Dennis (originator and organizer of the Audio-Visual Extravaganza) and his collaborators, J. Eric Juterbock and Krajg Adler; the Society for the Study of Amphibians and Reptiles for donating the Congress Poster (painted by David Dennis) and the book Contributions to the History of Herpetology (edited by Krajg Adler); and Ilya Darasvsky and his colleagues in Leningrad for the official congress badge.

And for being everywhere at the same time (besides Ian Swingland): Krajg Adler.* After the names of persons newly elected to the Executive and International Herpetological Committees of the World Congress were reported, Krajg Adler announced the results of the Executive Committee's election of senior officers earlier in the day. Robert L. Carroll (Canada) was elected Treasurer and Marinus S. Hoogmoed (Netherlands) as the new Secretary-General. Marinus Hoogmoed then assumed his new office and, after some brief remarks, declared the First Congress closed.

J. ERic Juterbock
SSAR Secretary
SSAR ELECTION RESULTS

The results of the 1989 SSAR election are as follows:
President-elect ............ Linda E.R. Maxson
Secretary .................. J. Eric Juterbock
Treasurer ................. Douglas H. Taylor
Board - Regional ........ Henry R. Mushinsky
Board - Zoological ......... Gustavo Casas-Andreu

A total of 656 members voted in this election.

The Society extends its gratitude to the Nominating Committee (James B. Murphy, Chair) and to the SSAR Elector (Ruth M. Zantzinger) for their hard work, and to the outgoing president and board members for their service during their terms.

NEWSNOTES

LONGEVITY SURVEY

The deadline for submitting data to the new edition of Longevity Survey of Reptiles and Amphibians in North American Collections is 31 May 1990. Please submit data to Kevin Bowler or Andy Snider, Audubon Zoo, 6500 Magazine Street, New Orleans, LA 70178, USA.

CROCODILIAN SYMPOSIUM PROCEEDINGS

A separately bound reprint of the symposium Biology of the Crocodylia that appeared in Volume 29, number 3 of the American Society of Ichthyologists and Herpetologists' Journal of Herpetology, September 1991, is available from Valentine Lance, Center for Reproduction, 1400 Marilla, City Hall Room 6AM, Dallas, TX 75201, USA.

DALLAS ZOO SEEKS ZOOLOGIST

The City of Dallas Park and Recreation Department is seeking qualified applicants for the position of Zoologist 12 in the Reptile Department of the Dallas Zoo. Responsibilities include research program development and coordination as well as assisting department curators. Qualified applicants must have a bachelor's degree in zoology or a related field and two years of research experience. Knowledge of the behavior, ecology and physiology of reptiles is highly desirable, as is a degree beyond the bachelor's level. Salary range is $22,344-27,132, depending upon education and experience. Applicants should state they are applying for the Zoologist 12/Reptile Department position in the Park and Recreation Department, and submit applications/resumes by 15 May 1990 to: Staffing Manager, Personnel Department, 1500 Marilla, City Hall Room 6AM, Dallas, TX 75201, USA.

SOCIETIES

ADDRESS CHANGES

The following address changes have been submitted since the list of herpetological societies was printed in the September 1989 issue of Herpetological Review:

American Society of Ichthyologists and Herpetologists
Florida State Museum
University of Florida
Gainesville, FL 32611, USA

Herpetologists' League
Texas Natural Heritage Program
Texas Parks & Wildlife Department
4200 Smith School Road
Austin, TX 78744, USA

Nordisk Herpetologisk Forening
Mr. Henrik Bringsoe, Chairman
Easpersvej 7
DK-4600 Koge
Denmark

Oklahoma Herpetological Society
c/o Bob Ball, Newsletter Editor
Route 1, Box 59
Goodwell, OK 73939, USA

Terrariengemeinschaft Berlin E. V.
Mr. Peter Grossman
Lepsiusstrasse 53
D-1000 Berlin 41
Federal Republic of Germany

Society officers are encouraged to forward any address changes for their society. Newly formed societies are invited to announce their existence in this column.

FEATURES

SEXUAL SELECTION AND COMMUNICATION IN AMPHIBIANS AND REPTILES

The First World Congress of Herpetology was held at the University of Canterbury in England from 11-19 September 1989. In attendance were over 1,000 amphibian and reptile biologists from over 60 countries. Included in the Congress program were six workshops, 11 roundtables and 27 symposia. One of the latter, the subject of this article, was devoted to studies of sexual selection and communication in amphibians and reptiles (17 September). It was convened and moderated by Murray Littlejohn (University of Melbourne, Australia) and Stevan Arnold (University of Chicago, USA).

Darwin (1871) developed the theory of sexual selection in order to account for the evolution of behavioral and morphological characters (usually exhibited by males) that function solely in the acquisition of mates. The symposium largely was focused on one aspect of sexual selection, intersexual selection or mate choice. This can be defined operationally as any pattern of behavior that leads to mates with certain members of the opposite sex than with others (Halliday 1983a). The second aspect of sexual selection, competition among members of one sex (usually males) for access to members of the opposite sex, also received some attention.

Intersexual selection implies that information is being sent by certain individuals and is
communication was developed by Lynn Houck (University of Chicago, USA), who presented the results of her studies of sexual behavior in the North American plethodontid salamander _Desmognathus ochrophaeus_. As in many salamander species, male _D. ochrophaeus_ deliver courtship pheromones to females during the initial stages of courtship. The pheromone is derived from specialized glands maximally developed only in sexually active males, and are delivered to females only during courtship (thus they are not the same as sex attractants, which operate over longer distances and before the initiation of mate choice by females). Houck demonstrated experimentally that exposure of females to the male's courtship pheromone renders them fully sexually responsive in a time shorter than that shown by females exposed to males in the absence of pheromone. The courtship pheromone apparently functions to "persuade" the female to mate by increasing her sexual responsiveness above some critical threshold level. In other experiments, Houck has demonstrated that there is considerable variation among males in their ability to elicit pheromone responses. At least some of this variation may be due to differences among males in the timing of pheromone delivery. Behaviors which males use to attract and/or stimulate females may incur costs as well as the obvious benefits of increased mating success. Thus a behavior might attract predators as well as potential mates. In frogs, calls used to attract females also may be costly because they are energetically expensive to produce; in some species, calling is the most expensive activity an individual can perform. Kent Wells and Theodorus Houck (University of California, USA) studied the energetics of calling in two treefrogs, with particular emphasis on how the cost of calling changes with increased levels of acoustic competition among males. In the North American frog _Hyla versicolor_, males call for longer durations when exposed to the calls of other males, but show a decrease in calling rate. Because of this trade-off, vocal interactions among males appear to have little influence on the energetics of calling in this species. Males appear to be able to change their maximum ability to call most of the time, the ceiling of which probably is set by the availability of glycogen in muscles. The situation is rather different in _H. micro cephalus_ from Central America. When exposed to the calls of other males, a male of this species adds notes to his own call and increases his rate of calling; the cost of calling increases with increasing chorus size. Increased rate of calling is only one means by which a male can attempt to maximize the efficiency of his own calls in attracting females. Another is for the male to time the production of his calls so as to avoid overlap with the calls of his neighbors. In this way he increases the conspicuousness of his own calls. Peter Narins (University of California at Los Angeles, USA) predicted that avoidance of overlapping notes by males increases the auditory signal strength of the Puerto Rican frog _Eleutherodactylus coqui_, because it is the properties of the call notes themselves (not internote intervals) that are important in male aggression and female attraction. Narins developed a model based on the assumption in which a given male actively avoids overlap with, at most, two neighbors. When Narins tested his model with data collected from natural frog choruses he found that, indeed, males avoid overlap with one or two neighbors. Frog calls have been studied using a number of different approaches, including behavioral studies of phonotaxis, computer modeling and acoustic and electrophysiological investigations of the auditory system. Michael Ryan and his colleagues (University of Texas at Austin, USA) presented evidence that physiological properties of the female auditory system might direct the evolution of male calls. In the frogs _Physalaemus pustulatus_ (Central America) and _Acris crepitans_ (North America) the auditory system of females is able to process a range of acoustic parameters far wider than the range which is typical of the species. As a consequence, once a call type evolves, properties of the female auditory system can exert directional selection on certain call characteristics (e.g., dominant frequency), thus directing their evolution. The sensory apparatus of the female clearly is an important factor in shaping the evolution of male vocalizations.

Houck's work on a natural population of the South African frog _Hyperolius marmoratus_ was described by Neville Passmore and his associates (University of the Witwatersrand, South Africa). Male frogs and their calling sites were individually marked, and the males' activities were monitored in detail over a four week period. Chorus sizes vary greatly, and the night-to-night turnover of males was high. Considerable variation among males in mating success was found, with some males mating repeatedly and some not at all. However, large males were no more responsive to calling than the smaller males. A better predictor of male mating success was the number of nights that a male spent calling to attract females; the more nights, the greater his chances of mating. That large males were not at an advantage in natural choruses is surprising, for experiments on phonotactic responses of female _H. marmoratus_ have shown that call characteristics typical of larger males are preferred by females. In such experiments it is usual for there to be little or no background noise upon which vocal signals can be superimposed. What is the relationship of the results of phonotaxis experiments to patterns of male mating success seen under more complex, natural conditions?

To answer this question, Mandy Dyson (University of the Witwatersrand, South Africa) studied male mating success in a caged population of _Hyperolius marmoratus_ in which she manipulated male density (and thus the amount of background noise each male was forced to call against). Large males, producing the most attractive calls, were more likely to mate than were smaller males at low densities. However, at higher densities, Dyson found that this large-male advantage disappeared, with patterns of male mating success becoming random with respect to body size. Dyson suggested that studies conducted in the presence of background noise at higher densities resulted in high levels of acoustic interference. As a consequence, female mating preferences could not be effectively expressed. Male mating tactics and patterns of male mating success have been observed extensively in the bufonid anurans. Considerable
variation exists both within and among species in the tactics used by males to acquire mates, e.g., calling from fixed sites, the adoption of silent sacrifice and intense scramble competition. Similarly, there is great variation in the degree to which males of certain phenotypes are more successful in mating.

Anthony Arak (University of Oxford, England) considered the causes of intraspecific variation in male behavior in toads. He argued that individual males adopt tactics likely to give them the highest probability of mating based on their own phenotype (e.g., body size) and prevailing conditions at the breeding site. Of the latter, male density and the ratio of males to reproductive females (the operational sex ratio) are the most important factors. Female bufonids are far from passive, however. In many species, females prefer as mates those males that produce the most conspicuous calls. However, as with Hyperolius marmoratus, the extent to which a female can effectively express her choice depends upon the intensity of competition among males.

That females benefit from choosing particular males as mates is obvious in those cases where males defend some resource necessary for successful reproduction by females. The situation is less clear in those species in which males provide only genes to their offspring. Bruce Woodward (University of New Mexico, USA) reported the results of experiments on the relationships between large and small fathers, Woodward showed that offspring performance is greater if their fathers are of large body size. For anuran species and mates of superior phenotype.

The egg is one of the most vulnerable stages in the life cycle of turtles. Mortality factors include: erosion of the surrounding substrate, mechanical damage to the shell, changes in the physical-chemical conditions of the substrate (humidity, temperature, salinity, etc.), infection by pathogens such as bacteria or fungi, and predation by various vertebrates and invertebrates (Acuña 1980; Moll & Legler 1971; Pritchard et al. 1984; Dodd 1988). Invertebrate predators include crabs (Márquez et al. 1976), ants (Hughes 1974; Witherington 1986), and fly larvae. Fly larvae have been reported from eggs of Malaclemmys terrapin (Aldrich 1916), Trionyx muticus (Mueller 1921), Graptemys pseudogeographica (Vogt 1981), and Lepidochelys olivacea (Pollmoni 1988). The flies in these cases were all Sarcopagidae. Manuel Benitez (pers. comm.) has found unidentified fly larvae in decomposing eggs of Caretta caretta buried 30-40 cm below the soil in El Salvador. Two species of flies of the family Phoridae have been reported from eggs of Rhinoclemmys pulcherrima.

From a natural nest found in March 1988 in the city of Puntarenas (Puntarenas Province), Costa Rica, six eggs of Rhinoclemmys pulcherrima were placed in an incubator in which the temperature was maintained at 28°C. The eggs were partially buried in sterilized soil. After 113 days in the incubator, three of the eggs became darker and appeared to have stopped developing. One of these
three eggs was dissected and was found to contain fly larvae. The remaining two eggs were then transferred to a cage covered with fine mesh cloth. Within one week adult flies emerged from the decaying eggs. The other three eggs from the nest hatched normally.

Some of the flies emerging from the original two eggs were transferred to bottles containing a nutrient medium composed of agar (4 g), banana (100 g), dry active yeast (a few grains), propionic acid (2 g), and water (95 ml). The remaining flies were left in contact with the decomposing eggs where another generation was completed. These flies from the second generation, having exhausted their food supply of decomposing eggs, were then placed in bottles containing nutrient media. The cage containing the emerged flies was cleaned and supplied with two fresh eggs from a captive (unmated) turtle of the same species. The eggs were first washed in water and were then partially buried in autoclaved soil and held at ambient temperature (18-26° C); a fine mist of water was applied to the soil every four days in order to avoid dehydration.

The flies reproduced very well on the nutrient media and apparently interbred with those of the second generation from the original field collected turtle eggs. The eggs from the captive turtle were readily attacked and adult flies emerged in ca. two weeks.

The flies were identified as a species of Phoridae, Megaselia scalaris (Low) (identification by Brian Brown, University of Alberta). This species is extremely polyphagous, having been previously reported from various insect hosts (especially insects in culture), rotting plant tissue, feces, and as a cause of human myiasis (Robinson 1971). Megaselia scalaris has also been reared from viable frog eggs: a phyllomedusine in Costa Rica and a leptodactylid in Puerto Rico (Villa & Townsend 1983). We have encountered only one previous record of M. scalaris from turtle eggs (Moll & Legler 1971).

When turtle eggs are transferred from the field to the laboratory many of the eggs are frequently found to be infected by bacteria or fungus (Acuna 1980; Wyneken et al. 1988). It is possible that M. scalaris locates turtle eggs, in the field as well as in the laboratory, by means of odor from rotting eggs. Nonetheless, when flies were placed with fresh eggs from the captive turtle they demonstrated no difficulties in locating the turtle eggs. Another possible source of attractant for the flies is the cloacal secretions that have been observed in R. pulcherrima during deposition of eggs (Monge-Najera et al. 1988). These cloacal secretions may not have been removed by simple washing. Eggs of M. scalaris here reported to be most vulnerable during hatching but this was not the case in R. pulcherrima.

The adult females of M. scalaris oviposited on the surface of the captive turtle eggs and in the soil covering the eggs. Studies of the ultrastructure of the egg shell of R. pulcherrima have demonstrated the existence of pores ranging in size from 100 to 700 micrometers (Acuna 1987). Newly hatched larvae of M. scalaris were found to have a maximum diameter of 470 micrometers and are therefore quite capable of entering the eggs through larger pores. Once inside the shell the fly larvae probably utilize proteolytic enzymes to break through the egg mem-

brane. Larval feeding within the egg causes the egg to become dehydrated, which in turn results in shell breakage. Flies were observed pupating within the egg and adults probably depend upon shell breakage for emergence from the egg.

Megaselia scalaris is certainly one of the most polyphagous of all insects, attacking a wide range of rotting materials as well as non-rotting but defenseless meat. In the case of turtles this fly appears to be capable of attacking both developing eggs (Moll & Legler 1971) and non-developing eggs (our results). Further study is needed to determine its role as a mortality agent of turtle eggs under natural conditions and whether rates of attack differ between turtle species.

ACKNOWLEDGMENTS

We would like to thank Vilma Castillo Cen- teno for her enthusiasm in stimulating this study, Bernal Badilla V. for constructing the screen cages, Rafael Hernandez for helping in the preparation of the media, and Brian Brown for the identification of the flies.

LITERATURE CITED


Polimeni-Salinas, J.G. 1988. Incubación arti- ficial de huevos de la tortuga lora Lepi- dochelys olivacea (Reptilia: Cheloniidae) sometidos a diferentes sustratos de incu-
two cryptic species within *A. talpoideum* (Lowcock, pers. comm.). Larvae from the Mississippi Valley Physiographic Province (Oktibbeha Co., MS and Shelby Co., TN), however, are distinctly different in pigmentation pattern from individuals found in the Atlantic Coastal Plain Physiographic Province (Union Co., NC; Aiken, Allendale, Barnwell, Charleston, Hampton, Orangeburg, and Sumter Counties, SC; Semlitsch, pers. obs.). Further detailed systematic biochemical and morphological studies of geographic variation are clearly needed to fully eliminate this possible explanation.

One of the reports of *A. talpoideum* egg-laying appears erroneous. Mosimann and Uzzell (1952) reported finding seven masses containing 10-41 eggs and nine adult *A. talpoideum* in a small pond in Dorchester Co., SC. Their report, however, is based on indirect evidence; neither did they observe directly *A. talpoideum* ovipositing nor did they rear larvae from those eggs to metamorphosis. Indeed, *A. talpoideum* is abundant in Charleston Co., SC and one of us (RDS) has found numerous ponds with single eggs presumably laid by *A. talpoideum* and also egg masses presumably laid by *A. tigrinum*. Larvae reared from similar egg masses collected in Aiken Co., SC have been identified as *A. tigrinum*. The single eggs, attached to decaying leaves, could easily have been overlooked if we had been "expecting" egg masses such as previous reports described. The egg masses of *A. tigrinum* in South Carolina have a similar appearance and contain a similar number of eggs (249) as do *A. talpoideum* egg masses reported from Mississippi and Louisiana. The egg masses of *A. tigrinum* in South Carolina, however, have a much thinner and "softer" external envelope than do those of *A. maculatum*, which Mosimann and Uzzell (1952) used for the comparative basis of their identification. *A. talpoideum* eggs are from southern Mississippi Valley Physiographic Province. We have reared larvae to metamorphosis from eggs of both types (masses and single) from several natural ponds in both regions that, unquestionably, are *A. talpoideum* (preserved specimens are available for examination). In 10 years of study, South Carolina *A. talpoideum* females (both metamorphic and paedomorphic) have only oviposited eggs singly in natural habitats, dishpans, plastic wading pools, and cattle tanks. Masses have never been "expected" egg masses such as previous reports described. The egg masses of *A. tigrinum* locality records—be wary. Herp. Review 19:53. Mosimann, J.E., and T.M. Uzzell, Jr. 1952. Description of the eggs of the mole salamander, *Ambystoma talpoideum* (Holbrook). Chicago Acad. Sci., Nat. Hist. Misc. 104:1-3. Semlitsch, R.D. 1985. Reproductive strategy of a facultatively paedomorphic salamander *Ambystoma talpoideum*. Oecologia 65:305-313. Semlitsch, R.D., D.E. Scott, J.H.K. Pechmann. 1988. Time and size at metamorphosis related to adult fitness in *Ambystoma talpoideum*. Ecology 69:184-192. Shoop, C.R. 1960. The breeding habits of the mole salamander, *Ambystoma talpoideum* (Holbrook), in southeastern Louisiana. Tulane Stud. Zool. 8:65-62.

**ACKNOWLEDGMENTS**

We thank A. Braswell, J.W. Gibbons, M. Jackson, T. Lamb, J. Pechmann, and C.R. Shoop for comments on this manuscript and R. Altig and L. Lowcock for their information.

**LITERATURE CITED**


**TECHNIQUE**

**A NEW PROCEDURE FOR DERMESTID BEETLE PREPARATION OF SKELETONS FROM FORMALIN-FIXED SPECIMENS**

Dermestid beetles (Coleoptera: Dermestidae) have long been used to prepare vertebrate skeletons (e.g. Hildebrand 1998). Fixed specimens (those either fixed in formalin, stored in 70% ethanol, or both) are difficult or impossible to skeletonize using standard dermestid techniques. Attempts to make these specimens more palatable to dermestids include application of beef fat or bacon grease (De La Torre 1951) or cod liver oil (Hooper 1958). In our experience dermestids stop feeding once the superficial layer of grease is removed and the process must be repeated. Alternatives to dermestid cleaning (maceration, hand cleaning) are time and labor intensive and usually do not produce skeletons of equivalent quality.

While preparing large series of skeletons from both fixed and fresh reptile specimens, we have found a method yielding far better results than any others we have tried. The only material needed for treatment is fresh muscle tissue or blood. The procedure is as follows.

1. Fixed specimens (to be skeletonized) are skinned, eviscerated, and soaked in cold or room temperature tap water for 1-3 days, depending upon body mass. Water changes may be made, but do not appear necessary.
2. A "blood solution" is prepared. A fresh specimen is soaked in a container of cold tap water until the water is full of blood and body fluids. It is useful to make one or more large incisions to allow the fluids to leave the body. A ratio of ca. 5:1 (body volume: water volume) works well. If the specimen is frozen it may remain soaking until thawed (overnight or longer for large specimens).
3. The fixed specimen is then soaked in this "blood solution" for 3-14 days (depending largely on body mass) at room temperature. It is then removed, excess blood removed by blotting or air drying, and the damp specimen placed in the dermestid colony. It is not recommended that it be placed in the colony while very wet, unless it is of a size that can be cleaned in one day or so, as dampness tends...
to promote mold. Depending upon the condition of the dermestid colony, it may also help to remove all other food sources while the fixed specimen is present.

In some cases the dermestids do not completely clean the specimens. Even repeating the blood soaking procedure as many as six or seven times with a single specimen was usually more efficient and quicker than using cod liver oil or grease. In many cases specimens were completely cleaned after one blood soaking. This was rarely the case with other treatments.

This procedure does not require a fresh cadaver as a blood source each time. We have had excellent results by saving pieces of muscle tissue whenever fresh reptiles (e.g., zoo or pet shop specimens) were available. We have successfully used pieces that had been stored frozen for at least four years. Frozen muscle pieces from any fresh cadavers could readily be stockpiled for future use.

This method might work with mammalian muscle and blood (e.g. from butcher shops) but we have not tried this.

Many variables may affect the success of this procedure, including concentrations and amount of fixative, length of time stored in fixative or preservative, and buffers present. These factors were unknown in nearly all the specimens that we prepared. We could not ascribe the observed variation in our results of these factors. We believe that extreme precision in temperatures, times or volumes used is not critical. Larger specimens tend to take more time for each step of the process than do smaller ones.

We have not had any major problems with this procedure. The odor produced by an extended blood soaking is comparable to that produced by maceration, so that adequate ventilation is required. We have not observed bone discoloration known to be due solely to this procedure. Many of our fixed specimens were noted during the springing process to have discolored bones and we suspect that much of this is due to the action of the fixative. In any case, discoloration would seem a small price to pay for an otherwise clean skeletal preparation. We have not tested this method with terrestrial isopods (Maiorana and Van Valen 1985).

**LITERATURE CITED**

**HERPETOLOGICAL HUSBANDRY**

This section of Herpetological Review deals specifically with the husbandry of captive reptiles and amphibians. Articles concerning any aspect of successful exhibit design, techniques for maintenance and breeding, egg incubation, and rearing of the young are acceptable based on the success of the husbandry program, the quality of written work, and the overall value of the presented material to the herpetological community. Reproductive articles should stress the actual methods and specimen manipulation involved but must also include observations of behavior, growth, and statistical data. Of particular interest are reports describing consistently successful, long term programs which deal with large numbers of a single species or genus.

Longer husbandry manuscripts should be divided into appropriate sections including Literature Cited. Black and white photos and line drawings are acceptable. All manuscripts will be reviewed by the Section Editor, and frequently by another individual within the particular area of expertise. Reports which do not deal with herpetological husbandry per se (for example, the description of eggs and young from a wild-caught gravid female) will be forwarded to the Editor for consideration as a Feature Article. In order to reduce publication time, husbandry articles will be directly sent to the Section Editor, Bern W. Tryon, Knoxville Zoological Park, Box 6040, Knoxville, Tennessee 37914, U.S.A.

**REPRODUCTION IN THE PANCAKE TORTOISE, Malacochersus tornieri, IN CAPTIVE COLLECTIONS**

The pancake tortoise has long been of interest to zoos and collectors, yet captive reproduction in this species is still sporadic and fortuitous. This paper will report by the breeder with substantial numbers of Malacochersus tornieri collections in the Washington, D.C. area, and review the published literature on the subject.

The National Zoological Park (NZP) acquired its first female pancake tortoise, which is still in the collection, in May 1965, but did not add any males until April 1972. Since then the collection has fluctuated considerably, from 1.2 to 4.7 adults housed in one or more groups, but has typically consisted of 1.3 adults in one exhibit. NZP presently has 3.6 adults in two separate groups.

The private collection of Anne F. Darlington (AFD) consists of 1.1 adults acquired as subadults in March 1986 and a subadult female added in February 1988.

**HUSBANDRY**

Caging and environment. Housing of the NZP animals has varied but usually they have been maintained as a group in an indoor exhibit similar to the current one. This is a 2.5 x 2.5 m enclosure with a 60/50 sand and potting soil substrate, and rockwork around the periphery forming crevices for the specimens and planters for live Euphorbia and Sansevieria. An 80 watt fluorescent fixture positioned 2.5 m above the substrate is set to give 12 h of illumination in summer and 9 h in winter. Skylights provide supplemental sunlight. Daylength at this 39°N latitude is 15 h in June and 9.5 h in December. The mean ambient cage temperature is 28.5°C, with an average daily fluctuation of 5.3°C. A 30 x 100 cm heating pad buried 5 cm under the substrate provides a hot spot exceeding 40°C. A water bowl is always available.

NZP specimens maintained off-exhibit are kept in a 1.2 m square plywood box with wooden hideboxes. A year-round 12 h day-length is produced by an 80 watt broadspectrum fluorescent fixture suspended 75 cm above the substrate of crushed oyster shell. The ambient temperature averages ca. 28°C and is supplemented by a 250 watt infrared heat lamp which produces an area over 40°C. These specimens are placed in a pan of water three times a week.

The AFD collection is housed outdoors in the Washington, D.C. area where the weather permits. This typically means the tortoises are outdoors continuously from mid-June to mid-September but only during warm, dry, daylight hours in the spring and fall. The enclosure is a fenced 2.5x3 m area of grass with wooden and terra cotta pipe hideboxes, and a pan of water. Other tortoise species also occupy the pen.

When indoors, the AFD M. tornieri are housed in a 1.5x2 m cage with wooden hideboxes. A 12 h photoperiod is provided by an 80 watt broadspectrum fluorescent fixture 35 cm above the oyster shell substrate. The ambient temperature averages 24°C during the day and 20°C at night, with a heating pad on continuously at over 42°C. Twice a week the tortoises are placed in pans of water. When nesting is anticipated, a pan of slightly moistened, hard-packed soil is placed in the cage.

**Diet.** The NZP pancake tortoises receive the Reptile House's herbivore diet. Until 1985, this was a salad of vegetables and fruits, supplemented with canned dog food and a vitamin and mineral powder, but since then it has consisted of alfalfa hay with soaked dry dog food, some vegetables, fruits, and supplements. The adults are fed twice a week. The AFD collection is fed mostly greens with some vegetables and a small amount of fruit, at least four times a week. When outdoors the tortoises can graze freely, but rarely do so.

**COURTSHIP AND AGGRESSIVE BEHAVIOR**

**Season.** Courtship in the NZP collection is seen year-round at a low level of frequency. The AFD male typically only courts while outdoors, but then does so one or more times a week. Grimpe (pers. com.) reports that courtship is so common at all times of year at the Tulsa Zoological Park (TZP) that the sexes are periodically separated to reduce the stress on the females.

**Courtship behavior.** At NZP, a male typically chases a female and mounts from behind, extending his front legs so that his body is nearly vertical. While mounted, the male either gapes or fully opens and closes his mouth at intervals of ca. one sec, without distinct vocalization. Males have occasionally been seen biting females on the neck. The AFD male courts the adult female in the same manner, without any biting. However, his
behavior with the subadult female has included additional sequences. On several occasions, he circled the subadult female and systematically bit each of her appendages. When he climbed atop her, instead of assuming the copulatory mount he remained horizontal, holding her down with his body, biting and scraping with his forelegs at her head and forelimbs to keep her retracted. He kept her thus immobilized for as long as 10 min and then left without attempting copulation. On other occasions, he chased, mounted and copulated with the subadult female as with the adult, without biting or otherwise attempting to immobilize her.

Loveridge and Williams (1957) describe male pancake tortoises viciously biting the females during courtship, even gripping and dragging them by their marginals. Wilke (1983), however, refers only to chasing and copulation.

During the summer of 1988 the AFD male was seen chasing a juvenile Geochelone carbonaria on several occasions. Loveridge and Williams (1957) relate that a male repeatedly attempted to mate with a Kinixys b. belliana.

Size at maturity. The AFD male was acquired at 117 mm CL and 165 g mass, and first displayed courtship behavior at 124 mm CL and 213 g. Both females were ca. 130 mm CL, 250 g when the male began to court them, and the adult female was 145 mm CL and 400 g at her initial oviposition. An NZP male raised from a hatchling commenced courtship upon being introduced to the group at 115 mm CL, 215 g, when he was 3.5 years old, but was sexed a year earlier.

Aggression. In the first six months after introduction, this same NZP male made five attacks upon another male in the group, who had to be separated permanently. These generally consisted of bites to the hind legs, but on one occasion the aggressor had overturned the other male and was found standing on him, biting his limbs. The victim is blind from catacatacals, which may have been a causal factor.

No other incidents of male-male aggression have been observed, though both these males have been housed for extended periods in mixed-sex groups.

Beattie (1971), however, relates a similar case of an adult male repeatedly ramming and biting a juvenile one, and also describes an adult female initially showing aggression toward this juvenile "to establish pecking order." When the AFD subadult female was first introduced to the pair, the male immediately approached and sat for several minutes with his snout and front marginals actually touching hers. This was interpreted by the observer, perhaps anthropomorphically, as an act of intimidation. In the aggregate, these incidents suggest that groups of M. tordieri may form dominance hierarchies which could have an impact on the success of breeding programs. Additional observations are required, however, before the existence, strength, and nature of such hierarchies can be determined.

EGG LAYING

Season. Eggs have been found in all months of the year except February at NZP, with a slightly greater concentration from November through January. The AFD female has laid from October through January, Wilke (1983) gives a July to November nesting season, and Grimpe (pers. com.) a September to January one, though eggs have been laid at NZP through the winter to May. Shaw (1970) reports egg production throughout the year, with a somewhat higher level from September through December.

Gravidity. Gestation has not been determined for either collection, but the relative periods of breeding and laying of the AFD pair imply a period of at least 60 days. Observation of nesting, however, was not possible, and one is led to either collection that a female is gravid. Experience to date indicates that palpation is not successful in M. tordieri, since no eggs have ever been felt, even when a female was palpated only a few days before laying.

False-nesting. At NZP, pancake tortoises have repeatedly been observed digging nests without eggs later being found. Gyarmaty (1988) also observed that several days of nesting behavior precedes oviposition. The AFD female engaged in two-to-four false-nesting events prior to each of the first season's clutches, typically while remaining in the hidebox, and was twice seen digging the day after laying. No observations were made of the November 1988 clutch. In January 1989, the AFD female was observed digging nests on nine of eleven consecutive days, and so was given oxytocin. After laying an egg on the surface of the soil, she vigorously made covering motions with her hind legs for 10 minutes. Later that day and the following afternoon she was again observed making covering motions.

Nesting. All the AFD nesting behavior has occurred in the mid- to late afternoon. Most occurs at the same time of day at NZP, but some early morning and evening nesting also takes place. The female seems to prefer a very warm, well-lit location for the nest, and tips her head down and touches her chin to the soil before commencing. The nests are dug with the alternating rear leg movements typical of other tortoise species (Obst 1986), excepting behavior is the first indication in the NZP range from one to six clutches/yr/female (Gyarmaty pers. com.) and Grimpe (pers. com.) reports that of 52 eggs, seven hatched (13%), two died in the egg (4%), 35 were infertile (67%), four were found broken (8%) and four are now incubating.

Incubation methods and times. The NZP incubation method has varied over the years. The first hatching, in 1978, incubated in the exhibit substrate. Two others were from eggs artificially incubated in covered 10 gal aquariums heated with plumber's heat tape. The eggs were partially buried in dampened potting soil in plastic containers. The containers were placed in the aquarium on a layer of pea gravel and a relatively high humidity was maintained by adding water to the gravel. The mean temperature of this setup was 26.7°C (range 25.0°-30.2°C). The most recent hatching was set up in a human incubator with a mean temperature of 30.8°C (range 29.0°-33.8°C) and moderate humidity. The incubation periods (to pipping) for the first two were 169 and 237 days, but the eggs may not have been found immediately after they were laid. The last was 99 days, and the egg was definitely found on the day of deposition.

The AFD eggs were maintained in a poultry incubator which was set for 30°C (range 24-34°C). The eggs were placed in a mixture of sand and peat moss which was kept moderately dry. Incubation times (to emergence) were 177, 184 and 188 days. Wilke (1983) reports incubation times of 117 to 188 days, with a mean of 147, at 28°C and 95% R.H., and Grimpe (pers. com.) gives incubation times of 125, 167 and 187 days at 20-30°C. Shaw (1970) reports a mean of 175 days for 28 eggs, ranging from 113 to 221 days, using various incubation methods with temperatures fluctuating between 26 and 35°C.

HATCHLINGS

Size. As the embryo completes development, the carapace width is oriented along the length of the egg. To fit within the narrow diameter of the egg, the carapace length is reduced considerably by a deep fold across the plastron. Thus when the hatching first emerges it is highly bowed, and significantly wider than it is long. When the plastron has flattened, about after about 24 h, the hatchling becomes nearly circular and the carapace is only moderately domed. See Table 1 for egg
Husbandry. Both the NZP and AFD young are treated the same as the adults with regard to diet, environmental conditions and provision of water and hideboxes, except that they are fed four or more times per week and their food is finely chopped. They share the same strongly herbivorous dietary preferences as their parents. Their response to water is also as individually variable as in the adults. They have been maintained on an oyster shell substrate, housed in a variety of containers which are secure against their abilities to climb and squeeze through narrow cracks.

Growth. Hatchlings in both collections have quadrupled their weight by seven months old and doubled their carapace lengths by nine months of age. Wilke (1983) reports even faster gains. Gender identification may be possible at two to three years of age under captive conditions. Grimpe (pers. com.) reports that the first two TZP hatchlings were sexed as males by tail size and observations of mounting at three years old, though they were not responsible for fertile eggs until five years of age. An NZP male was first sexed at about two years, six months old.

Survival rates. Mortality in the hatchlings varies but is commonly low. Of the four NZP hatchles, a one-year-old juvenile and a nine-year-old male survive, a five-year-old female died of pneumonia, and a two-year-old juvenile died of intestinal impaction. The AFD hatchlings are only one year old or less, but doing well. Wilke (1983) and Grimpe (pers. com.) both have 100% survival rates (four and seven years, respectively) after their first hatch. Shaw (1970), however, reports only 10 of 31 hatchlings (32%) still alive at the end of the 10 year period covered.

DISCUSSION

Clearly the reproductive potential of M. tornieri is greater than implied by the one egg per season reported in the early literature (Loveridge and Williams 1957). However, the fertility and hatch rates in existing collections are too low for that potential to be realized. This may be due to the lack of some or all of the necessary environmental cues in captivity that control the breeding season. Alternatively there may be a genetic incompatibility of the individual specimens. M. tornieri has a discontinuous distribution, with isolated populations occurring only in rocky terrain where suitable cover is available (Eglis 1967). Thus it is possible that there is sufficient genetic disparity to result in reduced viability of offspring if the parents came from different areas. In addition, some as yet unidentified problem with diet, husbandry or incubation methods may be reducing the rate of reproduction. At present, no conclusions can be drawn from the data available, and further study is required to resolve the issue.

ACKNOWLEDGMENTS

We would like to give special thanks to Rusty Grimpe, Reptile Curator, Tulsa Zoological Park, for his generous provision of data, and to Dale Marcellini, Curator of Herpetology, National Zoological Park, for editing the manuscript.

LITERATURE CITED


ANNA F. DARLINGTON

Dames & Moore

7101 Wisconsin Ave., Suite 700

Bethesda, MD 20814, USA

and

ROBERT B. DAVIS

National Zoological Park

3000 Connecticut Ave., NW

Washington, D.C. 20008, USA

Table 1. Malacochersus tornieri egg and hatching sizes [mean (range)].

<table>
<thead>
<tr>
<th></th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Mass (g)</th>
<th>n=</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZP eggs</td>
<td>44.8 (32.0-51.0)</td>
<td>28.1 (16.6-38.4)</td>
<td>21.8 (10.5-29.2)</td>
<td>52</td>
</tr>
<tr>
<td>NZP hatchlings</td>
<td>39.1 (35.2-44.2)</td>
<td>NA</td>
<td>15.3 (13.3-16.6)</td>
<td>4</td>
</tr>
<tr>
<td>AFD eggs</td>
<td>46.8 (44.7-48.5)</td>
<td>26.6 (21.8-28.7)</td>
<td>20.2 (18.9-21.9)</td>
<td>7</td>
</tr>
<tr>
<td>AFD hatchlings</td>
<td>38.0 (37.4-39.0)</td>
<td>35.5 (34.8-39.3)</td>
<td>14.2 (13.4-15.1)</td>
<td>3</td>
</tr>
<tr>
<td>Wilke eggs</td>
<td>43 NA</td>
<td>28 NA</td>
<td>19 NA</td>
<td>23</td>
</tr>
<tr>
<td>Wilke hatchlings</td>
<td>38 NA</td>
<td>38 NA</td>
<td>11.6 NA</td>
<td>11</td>
</tr>
<tr>
<td>Shaw eggs</td>
<td>46.6 (42.7-51.5)</td>
<td>28.9 (25.5-31.7)</td>
<td>23.4 (19.1-27.7)</td>
<td>27</td>
</tr>
<tr>
<td>Shaw hatchlings</td>
<td>39.2 (36.5-47.5)</td>
<td>38.8 (37.8-42.4)</td>
<td>15.9 (12.4-23.3)</td>
<td>8</td>
</tr>
</tbody>
</table>

LIFE HISTORY NOTES

Life History Notes is analogous to Geographic Distribution. Individual notes are to concern only one species, and authors are requested to choose a keyword which best describes the nature of their note (e.g., Reproduction, Longevity, Morphology, etc.). Figures are permissible to illustrate any data, but should replace words rather than embellish them. The section's intent is to convey information rather than demonstrate prose! Articles submitted to this section will be reviewed and edited prior to acceptance.

Standard format for this section is as follows: SCIENTIFIC NAME (in caps), COMMON NAME (in parentheses) as it appears in Standard Common and Current Scientific Names for North American Amphibians and Reptiles, (Second edition, Collins, Conant, Huheey, Knight, Rundquist and Smith, 1982), KEYWORD (in caps). DATA on the animal (one, or at most two, references may be briefly cited in text—DO NOT include complete literature reviews—use summary articles whenever possible). Place of deposition or intended deposition of specimen(s), and catalog number(s). Then, skip a line and close with SUBMITTED BY (Name(s) in caps, and address(es) in full—in no abbreviations). (NCN) used for common name = no recognized common name.

Recommended citation for articles appearing in this section is as for Geographic Distribution.

ANURA

ELACHISTOCLEIS BICOLOR. AMPLEXUS BEHAVIOR. On 25 November 1967 a pair of E. bicolour was observed in amplexus at Roque Saenz Pena (26°47'S-60°27'W), Chaco, Argentina. Axillary amplexus was observed in open water; the male was glued to the back of the female by a secretion produced by a glandular area of the male's chest behind the axilla. Externally, the glandular area appears as a porous, slightly darker pigmented area of skin that covers ca. 17-20% of the ventral surface. The secretion is strong enough to keep the frogs bonded together after placement in chloroform. The natural process of detachment is unknown. The specimens were deposited in the collection of the Fundacion Miguel Lillo, Tucuman, Argentina (FML 04357).

Submitted by G.J. SCROCCHI and E.O. LILLI, Instituto de Herpetologia, Funda- cion Miguel Lillo 251, 4000 Tucuman, Argen- tina.

CERATOPHYS CRANWELLI (Escucerzo). OVIPOSITION. On 28-30 October 1985, oviposition in C. cranwelli was observed at Monte Quemado (25°28'S-62°52'W) Santiago del Estero, Argentina. Males called from open areas on the margins of a pond; am-plexus occurred in shallow water. During amplexus the frogs swam slowly on the surface, then dived suddenly, spraying ca. 25 eggs into the water when the cloacas were nearly perpendicular to the surface. During oviposition the female produced a series of lateral movements with the femurs.
after which the pair returned to the surface, moved forward 3-5 m, and repeated the process several times during the same night. The eggs floated for a couple of minutes, then scattered individually as they sank slowly to the muddy bottom.

As tadpoles of this species are carnivorous and sedentary, it's likely that this behavior results in a selective advantage that reduces fraternal cannibalism. Voucher specimens (FML 03835) were deposited in the collection of the Fundacion Miguel Lillo, Tucuman, Argentina.

Submitted by E.O. LAVILLA and G.J. SCROCCHI, Instituto de Herpetología, Fundación Miguel Lillo 251, 4000 Tucumán, Argentina.

CAUDA DATA

On the evening of 21 February 1981 I observed a mass unidirectional movement of Plethodon dorsalis in the LaRue-Pine Hills Ecological Area of the Shawnee National Forest in Union County IL. While driving on F.R. 345 between the face of the Pine Hills bluff and the LaRue swamp (T11S, R3W, Sec 16 and Sec 9) just after sunset during a brief but heavy rain, I observed roughly 100 salamanders crossing the road. All but one were descending from the bluff toward the swamp.

Southern Illinois experienced a drought in 1980, with total precipitation recorded at Cairo, IL (ca. 70 km SE of site) 28% below the 1941-1970 30-year mean (NOAA 1980. Climatological Data, National Summary 31[1-13]). Whereas January 1981 was also abnormally dry, with precipitation 91% below average, February 1981 was only 5% below normal (USDA 1981. Weekly Weather and Crop Bulletin 66[1-8]).

It appears that this mass movement of salamanders was in response to a period of increased moisture during the drought. Plethodon cinereus is less mobile and forages less efficiently during dry periods (Jaeger 1972. Ecology 53:535-546). Movement to a site that retains moisture (such as the vicinity of the swamp) may allow salamanders to continue to forage efficiently during dry periods.

I wish to thank Geri Hawley, Thomas Locke, and Gail Nachel for assistance in removing salamanders from the road, and Dale R. Jakson for commenting on the manuscript.

Submitted by JOHN G. PALIS, Florida Natural Areas Inventory, 254 East Sixth Avenue, Tallahassee, FL 32303, USA

TESTUDINES
CHELYDRA SERPENTINA (Common Snapping Turtle). FEEDING BEHAVIOR. Snapping turtles are particularly catholic in food selection. Nevertheless, the near exclusive diet of duckweed (Lemna) by a large (32.0 cm CL) male from Lake Co. Illinois seems worthy of note. In a biotelemetry study of turtles at Chain O'Lakes State Park, this turtle was observed feeding at the surface of a duckweed covered pond on ten occasions between 25 May and 3 August 1988. Feeding times ranged from 1250 h to 1655 h with pond temperatures (10cm depth) varying from 19° to 34° (mean 29°) C. Although the dense duckweed obscured details of the feeding process, the turtle appeared to be using neustophagia (Belkin and Gans 1968. Ecology 49:768-769). Periodically raising the head just above the surface, the animal would then open and close its jaws several times in succession. After foraging for 1 to 10 min in a small area (ca. 1 m²), it would move several meters and repeat the procedure.

The sample was soaked and fecal and fotal samples were obtained on May 23, 29, and June 13. On July 26 the stomach was flushed (Legler 1977. Herpetologica 33:281-284). Composition of the 45 ml of feces collected was Lemna 92%, other plants 6%, and animal remains (insect, mollusks, amphibian bones) 2%. Composition of 50 ml of regurgitate from the flux was Lemna 95.5%, vascular plants 2%, and animal matter (snails and fish) 2.5%.

Lemna has been previously reported in snapping turtle diets but not as a staple (Ernst and Barbour 1972. Turtles of the United States. The University Press of Kentucky, Lexington, p. 24). Diets of 21 other snapping turtles collected at the site comprised ca. equal amounts of plant and animal material but no other individual had consumed more than trace amounts of duckweed. Fish was the most important animal food occurring in 38% of the samples and comprising 24% of the total volume consumed.

Submitted by JENNIFER BUDHABHATTI and EDWARD O. MOLL, Department of Zoology, Eastern Illinois University, Charleston, IL 61920, USA

HYDROMEDUSA MAXIMILIANI, ECOLOGY. H. maximiliani has a wide distribution in SE Brazil, ranging from Espirito Santo (20°S) to Sao Paulo (Luderwaldt 1926. Rev. Museo Paulista 14:403-468). Virtually nothing has been published about the ecology of this species.

On 7 and 12 November 1988, 15 active individuals (2.10.3) were observed in a 1 km section of a small rocky stream 1-3 m wide in a subtropical rain forest at 800 m elevation in the Carlos Botelho State Reserve (24°39'S; 47°59'W) (water pH = 7.9, water temperature = 16-18° C, air temperature = 16-20.5° C). The cloacal temperature of the turtles ranged from 16°-20.0° C, X = 18.7° C; N = 12. The temperature of an individual captured while basking on a stone in a small patch of sunlight was 19° C. The body temperatures recorded for active H. maximiliani are the lowest recorded for a neotropical turtle, and only comparable to some Emydids (Brattstrom 1965. Amer. Midland Nat. 73:376-422).

The shells of adult H. maximiliani have a cryptic shape similar to that of a dead leaf (the carapace is in juveniles light green and lighter in color); the turtles rest at curves in the stream where dead leaves accumulate. Low light levels in the forest make the turtles very cryptic in these microhabitats.

Feces were examined from five newly-captured turtles and included remains of several insect orders: Coleoptera; Isoperta; and Neuroptera as well as several unidentified insect larvae. The decaped crustacean Aegla odelbrechi was the most common food item found in feces. No vertebrate remains were found in feces; grains of quartz and plant fibers found in the feces were probably taken incidentally. A female captured in November 1988 laid three 40 x 25 mm eggs in January 1989.

I thank S. Pacagnella for logistical support during this study. A.S. Abe and W. Magnuson provided comments on the first draft of the manuscript.

Submitted by CARLOS YAMASHITA, Universidade Paulista Julio de Mesquita Filho, Instituto de Biociencias, Zoologica, Rio Claro, Sao Paulo 13.500 Brazil

LEPIDOCHIELYS KEMPI (Kemp's Ridley Sea Turtle). REPRODUCTION. Kemp's ridley, the most endangered of the world's sea turtles, has a highly restricted nesting distribution. Approximately 95% of the nesting population emerged on a single 32 km beach (Ranchos de Eden and Nuevo) in Tamaulipas, Mexico. Only a small number of nesting records exist for localities elsewhere in Mexico and in Texas; there is one unconfirmed report from Colombia (Ross et al. 1989. The status of Kemp's Ridley. Report to the Center for Marine Conservation, Washington, DC, 51 pp.).

On 30 May 1989 at 0930 h EST, a Kemp's ridley nested on Florida's west coast at Madeira Beach (27° 47' N; 82° 48' W, Pinellas Co., 146th Ave. and Gulf Blvd.). This represents the first documented nesting of Lepidochelys kempf in Florida. Although this species is regularly recorded along Florida's west coast, most of these animals have carapace lengths that indicate that they are immature (Ogren, L. 1988. Pp. 116-123, Proc. First Int'l. Sympos. on Kemp's Ridley Sea Turtle Biology, Conservation, and Mgmt. [C. Callouet and A. Landry, eds.]. Texas A&M Univ. Seagrass Program [TAMU-SG-89-105]).

The ridley deposited 116 eggs, which is a normal complement for this species; daytime nesting is also typical. The nest was inundated by storm tides on 6 June and relocated within a few hours to higher ground. Eighteen hatchlings emerged at dawn on 27 July, and an additional 6 on 28 July, after incubation periods of 58 and 59 days, respectively. Several hatchlings that died in the nest have been deposited in the American Museum of Natural History (AMNH 135224-27).

The nest site was on a highly developed stretch of coast, with high-rise condominiums and a seawall immediately adjacent. Dozens of tourists witnessed the turtle's emergence and nesting. A videotape of the Herp Review 21(1), 1990 	 19
nesting sequence is archived at the Florida Marine Research Institute.

An attempted nesting by a second Kemp's ridley was recorded that same month on the east coast of Florida. On 22 May 1989 (1150 h EST), a ridley emerged at Phipps Ocean Park, in Palm Beach (Palm Beach Co., 4 km north of Lake Worth Bridge). The turtle excavated a nesting chamber but did not deposit eggs. A second sighting of what was presumed to be the same turtle was made by JF on 5/30; crawls observed in the same vicinity on 5/23 and 5/31 are also attributed to this animal. No eggs were deposited during any emergence, as far as is known. A photograph of this ridley taken by JF on 22 May 1989 is archived at the Florida Marine Research Institute. Neither the west coast nor the east coast ridley was the tagged.

Submitted by ANNE MEYLAN, PATRICIA CASTANEDA, and COLLEEN COOGAN, Florida Marine Research Institute, 100 6th Avenue, S.E., St. Petersburg, FL 33701; TONY LOZON, Florida Environmental Preservation Association, 78146th Ave., Madeira, FL 33708; and JOHN FLETEMEYER, Town of Palm Beach, P.O. 2029, Palm Beach, FL 33480, USA


Three wild-caught animals (2.1) were obtained from a dealer in June 1987. Animals were housed in a 50x30x30 cm glass terrarium, with a layer of sand, some rocks and branches. It was heated by a 25W spotlight for 5-8 h/day (increasing with the natural daylength) resulting in ground temperatures of 15-35°C (X=18°C).

After hibernation at 3-5°C from 5 December 1987 to 17 January 1988, 21 matings of these four lizards were observed from 4 February to 30 April 1988. The male approached the female and secured a mouthgrip on the side of her tail or body. Save for a few forward steps, receptive females remained passive. In 20.5±9.5 (5-44) seconds (X±S.D. (range)) the male reached, by quick snapping movements, a position just before her hind legs. He then curled his body as she raised her tail base and they copulated.

Just after intromission was achieved, the male bit the female’s femur and within one or two seconds relocated his grip to the bifurcation of the same leg (Fig. 1). Rarely the femur bite was skipped. While in copula, one or two of the male’s front legs (most often the one underneath him) vibrated rapidly. I once observed that a male had not inserted his hemipenis. Five seconds after “copulation” began, an amber-colored droplet appeared on each of the two terminal tips of the hemipenis. Three seconds later the male pulled his cloaca away from her. As in all other sessions, the male released his bite-hold just after genital contact ended. Copulation took 11.1±3.2 (7-22) seconds. Immediately thereafter the male made fast (1-2 sec) semi-circles to figure 8’s, over or under but especially in front of her, preceded by pushing his snout against the female. He stopped each circling movement on snout contact with the side of her head or body (Fig. 2), then rested his head on the female. These actions, which somewhat depended on her activity, decreased in frequency and velocity from a maximum of 10/min at the beginning to less than once in 4 min near the end. They lasted for 28±12 (15-68) min. In between these motions the male adopted an attentive posture close to the female, sometimes even on top of her, or on the rock under which she hid for a moment: His head and body were extremely raised with his very fingertips touching the substrate. At the same time he made quick lateral scanning movements with his head.

In view of the very open habitat of the species (Peters 1982, op. cit.), a functional explanation of this behavior is that the male is on the look-out for competitors: In this phase activities of other species in neighboring cages caused fast dashes in their direction. If the female walked off, he either followed or prevented her from moving by increased circling thereby effectively barring her way. These behaviors preventing her “escape” are unique among the mating strategies of 24 (of the around 60 known) species of Lacerta and Podarcis observed by me. If more than one female was present, the male seemed unable to discern the recently mated one, and he divided his attentions, often even focusing on the wrong female, possibly since she tends to be more active than a recently counted one.

Sexual receptivity in the female lasts from one to six days after oviposition (one observation on day 11). On other occasions females rejected the male’s advances and tail vibrations. Females laid 1-3 clutches of 4-5 eggs in March, April and May. A young female produced a first clutch of only two eggs in her first mating season.

At oviposition eggs measured 7.1±0.4 (6.0-7.9) x 12.0±1.0 (10.0-13.7) mm with masses of 0.39±0.05 (0.35-0.49) g (n=22). Eighteen eggs developed. Just before hatching they reached 11.4±0.9 (10.9-12.9) x 18.8±1.5 (16.2-20.8) mm and 1.37±0.22 (1.16-1.71) g. Incubation took 49±3 (45-52, n=14) days at 25°C, and 32 days (32-34, n=4) at 30°C. SVL of hatchlings (n=18) was 25.7±1.7 (23-28) mm, CL 42.7±3.5 (38-48) mm; mass = 0.51±0.03 (0.46-0.56) g.

After completion of the studies the animals will be deposited in the Rijksmuseum van Natuurlijke Historie (RMNH), Leiden.

Submitted by HERMAN A.J. IN DEN BOSCH, Zoologisch Laboratorium, Division of Ethology, University of Leiden, P.O. Box 8516, NL-2530 RA Leiden, The Netherlands

SERPENTES

TANTILLA RUBRA RUBRA (Red Blackhead Snake). ARBOREALITY. The genus Tantilla is considered a nocturnal, fossorial form that lives under rocks, surface litter or in sub-ground retreats feeding on arthropods, ane-

lids, slugs, spiders and insect larvae. On 16 August 1976, a specimen (EAL 4566) was observed climbing a rough barked tree in a cleared, open area at 0930 h. It was clear and sunny. When first observed the snake was thought to be a vine or root until it was realized that it was moving upwards. It was ca. 3 m above the ground and out of reach when observed. It had to be flicked off with a collect-

ing rake to make the capture. It was collected 9.8 km SW Cerralvo and 16.7 km W on Rancho El Milagro, Picachos Mts., elev. 457 m, Nuevo Leon, Mexico by Ernest A. Liner, Richard M. Johnson and Allan H. Chaney.

Submitted by ERNEST A. LINER, 310 Mali-

boulevard, Houlton, ME 04736-2586 and ALLAN H. CHANEY, 1600 W Johnston 29, Kingsville, TX 78363, USA

XENOCHROPHIS FLAVIPUNCTATA (Common Keelback). REPRODUCTION. On 4 Feb-

ruary 1989 a freshly laid clutch of 25 eggs was found in a community cage of this species at a local animal dealer's shop in Bangkok. The clutch was taken home and placed on a sub-

strate of moistened vermiculite in an enclosed plastic jar. Incubation was achieved by leav-

ing the clutch exposed to daily atmospheric temperatures. In Bangkok during February the mean maximum temperature is 32.7°C and the mean minimum 22.8°C. The mean maximum temperature in March is 33.8°C and the mean minimum is 24.6°C.

On 19 March 1989 neonates began emerging from the eggs and by the morning of March 20 the last had left the egg. Distractions prevented measurement until the sixth day after hatching. One hundred percent of the eggs hatched, but three of the hatchlings escaped. Of the 22 measured on 25 March 1989 the largest had a SVL of 141 mm., the smallest 110 mm. The X SVL was 121.55 mm.

Figure 1. Copulation of Lacerta parva.

Figure 2. A male Lacerta parva circles a female after copulation.
completed their first shed six days after leaving the egg.

Submitted by MEREL J. COX, 695/17 Pracharaj Road, Soi Homhual, Bangkok 10800, Thailand

**GEOGRAPHIC DISTRIBUTION**

_Herpetological Review_ publishes brief notices of new geographic distribution records in order to make them available to the herpetological community in published form. Geographic distribution records are important to biologists in that they allow for a more precise determination of a species' range, and thereby permit a more significant interpretation of its biology.

These geographic distribution records have a standard format, and all authors should adhere to that format, as follows: SCIENTIFIC NAME, COMMON NAME (as it appears in Standard Common and Current Scientific Names for North American Amphibians and Reptiles, Second Edition, Collins, Conant, Hubey, Knight, Rundquist and Smith, 1982), LOCALITY (use metric for distances), DATE (day, month, year), COLLECTOR(S), VERIFICATION, PLACEMENT AND LOG NUMBER (required), COMMENTS, CITATION(S), SUBMITTED BY (give name and address in full—no abbreviations).

Some further comments. This geographic distribution section does not publish "observation" records. Records submitted should be based on preserved specimens which have been placed in a university or museum collection (private collection depository records are discouraged). Photographs may substitute for a preserved specimen only when the live specimen could not be collected (e.g., it was a protected species or it was found in a protected area). Photographs must be deposited in a university or museum collection, and the catalog numbers provided.

Please submit new geographic distribution records, in the standard format only, to Joseph T. Collins, Museum of Natural History, The University of Kansas, Lawrence, KS 66045, USA. Short manuscripts are discouraged, and are only acceptable when data cannot be presented adequately in the standard format.


(NCN) = no recognized common name.

**ANURA**


Submitted by FRANCISCO REYNOSO, Museo de Zoologia, Universidad Autonoma de Baja California Sur. Box 21, La Paz, BCS, 23000, Mexico


Submitted by MICHAEL REDMER, 21 W. 103 Par Ln., Itasca, IL 60143, USA


Submitted by GLYN TURNIPSEED, Department of Biology, Arkansas Tech University, Russellville, AR 72801 and BILL SHEPHERD, Arkansas Natural Heritage Commission, Little Rock, AR 72204, USA


HERPETOLOGICAL REVIEW

Herp Review 21 (1), 1990
ward range extension (ca. 88.5 km) (Dowling 1957. Occ. Pap. Univ. Arkansas Mus. 3:1-51).

Submitted by GLYN TURNIPSEED, Department of Biology, Arkansas Tech University, Russellville, AR 72801, USA


Submitted by MIKE McFARLAND, Barkhausen Water Fowl Preserve, 2024 Lakeview Drive, Suamico, WI 54173, and RIANA BISHOP, Division of Natural Sciences, St. Norbert College, De Pere, WI 54115, USA

SAURIA

ANOLIS (CTENONOTUS) DISTICHUS (Bark Anole). BAHAMAS: GRAND BAHAMA ISLAND: 24.1 km east of Freeport. 10 October 1988. H.A. Dundee. Verified by A. Schwartz. Subspecies not determined but Schwartz suggests a Bahamian subspecies (except octor or biminiensis), most likely daptelis. Tulane University (TU 21140). New island record. Dr. P. Fluck (pers. comm.) says this species (along with Anolis [Norops] sagrei) was on Grand Bahama as early as 1968. The species is locally common.

Submitted by HAROLD A. DUNDEE, Department of Biology, Tulane University, New Orleans, LA 70118, USA


Submitted by WILLIAM T. MCDOWELL, Biological Sciences Program, Southern Illinois University, Carbondale, IL 62901, USA

COLEONYX VARIEGATUS PENINSULARIS (San Lucan Banded Gecko). MEXICO: BAJA CALIFORNIA SUR: Isla Santa Margarita. 17 October 1983 and 29 April 1984. Francisco Reynoso. Verified by L. Lee Grismer. University of California, Los Angeles. These represent the first records of this genus and species from Pakistan. The only earlier record with definite locality data is mentioned in Smith (1935. Fauna of British India, Vol. 2, Sauria. Taylor and Francis, London, 440 pp) who listed it from Almora, Nainital, Kumaon District, Uttar Pradesh Province, India. This range extension is expected since the Himalaya ranges are continuous between the two definitely known localities.

Submitted by KHALID J. BAIG, Pakistan Museum of Natural History, Markaz F-7, Islamabad, PAKISTAN

SCHELORUS TORQUATUS MIKEPRESTONI. (NCN). MEXICO: NUEVO LEON: 19.6 km NE San Antonio de Pena Nevada, Puerto de Pena Nevada, 2743 m elev. 16 July 1980. Ernest A. Liner and Richard M. Johnson. E.A. Liner private collection (EAL 4751); 24.3 km NW San Antonio de Pena Nevada on La Joya road, Puerto de Pena Nevada area, 3002 m. 14 July 1969. E.A. Liner and R. M. Johnson. (EAL 4771; 2 specimens); 19.6 km NE San Antonio de Pena Nevada, Puerto de Pena Nevada, 2743 m. 6 August 1980. E.A. Liner. (EAL 4771); 18.3 km SW Zaragoza at La Encantada,

Submitted by MICHEL E. DORCAS and JOSEPH R. MENDELSOHN III, Department of Biology, University of Texas at Arlington, Arlington, Texas 76109, USA


Submitted by FRANCISCO REYNOSO, Museo de Zoologia, Universidad Autonoma de Baja California Sur. Box 21, La Paz, BCS,23000, Mexico


Submitted by FRANCISCO REYNOSO, Museo de Zoologia, Universidad Autonoma de Baja California Sur. Box 21, La Paz, BCS, 23000, Mexico


Submitted by JOHN G. PALIS, Florida Natural Areas Inventory, 254 East Sixth Avenue, Tallahassee, FL 32303, USA


Submitted by MARY SOBOTA, Division of Natural Sciences, St. Norbert College, De Pere, WI 54115, USA


Submitted by FRANCISCO REYNOSO, Museo de Zoologia, Universidad Autonoma de Baja California Sur. Box 21, La Paz, BCS, 23000, Mexico


Submitted by JOHN G. PALIS, Florida Natural Areas Inventory, 254 East Sixth Avenue, Tallahassee, FL 32303, USA


Submitted by MICHAEL E. DORCAS and JOSEPH R. MENDELSOHN III, Department of Biology, The University of Texas at Arlington, Arlington, TX 76109, USA


Submitted by FRANCISCO REYNOSO, Museo de Zoologia, Universidad Autonoma de Baja California Sur. Box 21, La Paz, BCS, 23000, Mexico


Submitted by JAMES N. STUART, Environmental Section, U.S. Army Corps of Engineers, P.O. Box 1580, Albuquerque, NM 87103, and WILLIAM G. DEGENHARDT, Museum of Southwestern Biology, Department of Franoicology, University of New Mexico, Albuquerque, NM 87131, USA


Submitted by IVAN INEICH and JEAN DEUVE, Museum national d’Histoire naturelle, Laboratoire des Reptiles et Amphibiens, 25 rue Cuvier 75005 PARIS, FRANCE

RHADINAE A MONTANA. (Nuevo Leon Yellow-lipped Snake). MEXICO: NUEVO LEON. 4.3 km N Las Adjuntas (by road), 792.5 m elev. 17 July 1985. Ernest E. Liner and Allan H. Chaney. Verified by Ernest A. Liner. E.A. Liner private collection (EAL 5002). Seventh known specimen of this species and extends the range eastward from the previous known localities ca. 34 km airline NNE of Ojo de Agua nr. Galeana (the type locality), and 55

Submitted by ALLAN H. CHANEY, Department of Biology, Texas A & I University, Kingsville, TX 78363 and ERNEST A. LINEY, 310 Mallibou Boulevard, Houma, LA 70364-2598, USA


Submitted by WILLIAM K. HAYES, DAVID DUVALL, WILLIAM A. GERN and GEORGE T. BAXTER, Department of Zoology and Physiology, University of Wisconsin, Madison, WI 53706, USA


Submitted by CHRIS T. MCALLISTER, Renal Metabolic Lab (151-G), Veterans Administration Medical Center, 4500 S. Lancaster Rd., Dallas, TX 75216, USA

TESTUDINES


Submitted by ENRIQUE RICHARD, Instituto de Herpetología, Fundación Miguel Lillo, Miguel Lillo 215, 4000—Tucumán, República Argentina and Proyecto Herpetofauna (FSVA), Sección NOA, Rivadavia 105, 5 to “G”, 4000 — Tucumán, República Argentina


Submitted by ENRIQUE RICHARD, Instituto de Herpetología, Fundación Miguel Lillo, Miguel Lillo 215, 4000 — Tucumán, República Argentina, and Proyecto Herpetofauna (FSVA), Sección NOA, Rivadavia 105–5to “G”, 4000 — Tucumán, República Argentina

CHELONIA MYDAS (Green Sea Turtle). ARGENTINA: CHUBUT PRERIQUE: Fondeadero Sarmiento shelf (42° 15'S, 64° 04'W). 13 July 1988. G. Venegas. Verified by J.A. Scolaro. Centro Nacional Patagónico, Colección Herpetológica (CNP-H #0331). This is the most southerly record for the species on the Atlantic coast and the first to be recorded on Valdes Peninsula, near Puerto Madryn city (Frazier 1984. Las tortugas marinas en el Oceano Atlántico sur occidental. Asoc. Herpetol. Argentina. S. Divulg. 2. La Plata. 22 pp.). The specimen (carapace length 39.5 cm; mass 5.7 kg) was collected dying at shore.

Submitted by JOSÉ ALEJANDRO SCOLARO, Centro Nacional Patagónico, Consejo Nacional de Investigaciones Científicas y Técnicas, Casilla Correo 68, (9120) Puerto Madryn, ARGENTINA


Submitted by DREUX J. WATERMOLEN, Division of Natural Sciences, St. Norbert College, De Pere, WI 54115, USA


Submitted by MARY SOBOTA, Division of Natural Sciences, St. Norbert College, De Pere, WI 54115, USA

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Herk Reviews 21(1), 1990 25


The records for Amador, Calaveras, Eldorado, Nevada, Placer, and Yuba Counties fill in some of the gaps in the known distribution of Clemmys marmorata in the Sierra Nevada foothills between Tulare County (MVZ 78788) and Butte County (Hayes and Cliff 1982). A checklist of the herpetofauna of Butte County, the Butte Sink and Sutter Buttes, California. Herp. Review 13(3):85-87. Two localities in Eldorado County with inadequate supporting information are listed in Appendix B of Brattstrom and Messer (1988). Current

status of the southwestern pond turtle Clemmys marmorata pallida, in southern California (in page 55). The first record for the county is the first for this turtle between Fall River Mills, Shasta County (Pope 1939. Turtles of the United States and Canada. Alfred A. Knopf. 343 pp.) and Ash Creek, Modoc County (Buskirk 1985. SSRAR Herp. Review 14(4):116).

Submitted by JAMES R. BUSKIRK, 4131 Terrace Street, Oakland, California 94611, USA.


Submitted by ENRIQUE RICHARD, Instituto de Herpetología, Fundación Miguel Lillo, Miguel Lillo 251, 4000 - Tucumán, República Argentina. The species was previously recorded from Salta Departments of General San Martin, Orán and Anta (Freiberg, M.A. 1967. Ciencia e Investigación, 23(8):351-363).

Submitted by ENRIQUE RICHARD, Instituto de Herpetología, Fundación Miguel Lillo, Miguel Lillo 251, 4000 - Tucumán, República Argentina. The species was previously recorded from Salta Departments of General San Martin, Orán and Anta (Freiberg, M.A. 1967. Ciencia e Investigación, 23(8):351-363).


Submitted by JAMES R. BUSKIRK, 4131 Terrace St., Oakland, CA 94611, USA.
in Bangladesh, only two, according to the author, can be considered endemic. These are the black softshell turtle (Trionyx nigricans) that is still present as a tank attached to the shore reported by Byazid Bostami at Chittagong and in nearby ponds, and the Indian eyed turtle (Morenia petersi), widespread in Bangladesh. Khan did suspect the occurrence of the latter within Indian limits, and the species has been found in recent years in the Indian state of Bihar (Das 1985; Moll and Vijaya 1986).

Each species account of chelonians consists of a brief description, with natural history and status notes, often of considerable interest. Khan deserves to be commended for the present volume describes only the commoner or more interesting forms. One of these, the flying lizard, is reported from the country by the author, from the Chittagong forests, based on a sight record: Khan assumes this to be Draco maculatus. The locality of the present specimen, however, more closely approaches the distribution of Draco blanfordii norvilii, known from the nearby Indian state of Assam as well as northern Burma (see Musters 1983). There are other interesting snippets of information on the lizard species. According to this book, the tokay gecko (Gecko gecko), the largest of the geckos, is used in folk medicine in Bangladesh as a substitute for the turtle trade, the resultant decline in wild populations and ways to stem this.

Compared to the chelonians, the lizard fauna seems impoverished, with only some 17 species recorded (Khan 1982) and the present volume describes only the commoner or more interesting forms. One of these, the flying lizard, is reported from the country by the author, from the Chittagong forests, based on a sight record: Khan assumes this to be Draco maculatus. The locality of the present specimen, however, more closely approaches the distribution of Draco blanfordii norvilii, known from the nearby Indian state of Assam as well as northern Burma (see Musters 1983).

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Seventy-nine snake species are known to occur in Bangladesh (Khan 1988). The present volume describes only the commoner or more interesting forms. Among which are the two python species, the rock python (Python molurus), now largely restricted to the Sunderbans, and the reticulated python (P. reticulatus), distributed over Syhit, Mymensingh and the three Chittagong Hill Tracts districts of Bangladesh. This is a relatively undersampled species, re-examined by the author in the Indian National Zoological Collection, maintained by the Zoological Survey of India (spec. No. 2126) with data indicating that it was collected from Rangpore in northern Bangladesh.


This volume is based on a workshop held in January 1987 in Rio de Janeiro, Brazil, that brought together a diverse group of botanists, zoologists, and herpetologists to examine pattern in the distribution of Neotropical organisms. The volume is refreshing in avoiding the facile explanation of current distribution provided by reference to hypothetical Pleistocene refuges that change location and species composition with changing climate. The authors analyze and interpret the data, and the imagination of the investigator. Surprisingly in such a volume the approaches are diverse and depth of coverage uneven since the aim was to inform the participants of on-going research by others. Four of the papers in the proceedings are of particular interest to readers of Herpetological Review and illustrate and emphasize this uneven treatment. For herpetologists interested in South America this forms a useful update and corrective for some of the extreme refugial positions taken in the South American herpetofauna volume edited by Duellman (1979).

John E. Cadle and J.L. Patton discuss the distribution of amphibians and reptiles (and mammals) along the eastern slope of the southern Peruvian Andes. Their treatment is very useful in detailing the altitudinal extent of species distributions for the region and the difference in pattern between mammals (greater diversity and finer vertical partitioning of the forested slopes) and herps. In addition they provide a cladistic basis for determining if the distributions of related taxa are the product of vicariant (allopatric) or gradent (parapatric) speciation models. They conclude that the former is the dominant one, without providing concrete analyses of relationships to support that conclusion. The interpretation of the origin of the fauna of the region is strictly dispersalist. Apparently the authors believe that the Andean slopes of southern Peru were a tabla blanca invaded from the north, south and east. It is not possible that a substantial portion of the fauna is autochthonous and has been more or less evolving in situ from a time prior to any Andean uplift? This would certainly be in keeping with their conclusion that Pleistocene events are not the principal influence on differentiation of the fauna of this region.

In a second paper W.R. Heyer undertakes a detailed examination of the adequacy of the anuran data base as a basis for determining patterns and evaluating their significance east of the Andes. He concludes that even though the data base has dramatically increased in the last 10 years, it remains inadequate for reasoned description of pattern (too much missing data) or historical causes (too many possibilities for ad hoc hypothesis construction). Nevertheless, Heyer is willing to highlight certain features of Neotropical frog distribution, which based upon his broad knowledge and experience, provide a context for future study. These include an emphasis on the morphoclimatic domains of Ab'Saber (1977) as correlates of distributions, the significance of open versus forest formations.
and the tendency for forest species to have smaller areal ranges than those in other formations.

In another paper M.T. Rodrigues reviews the distribution of the lizard genus Tropidurus in Brazil with particular regard for broad ecological determinants. Although he emphasizes the importance of the morphoclimatic domains in this treatment, one is impressed by the fact that most of the figured species distributions show low fidelity in terms of restriction to a particular domain. More impressive is the essential absence of this genus from the Amazonian forest region while it occurs in all other open and forest formations. An interesting conclusion is that the caatinga area has an endemic component rather than simply being invaded by species from adjacent open formations during the drying trend of the current interglacial.

In a more general paper on lizard distribution P.E. Vanzolini provides an excellent and detailed review of species occurrence in Amazonian and Atlantic Forests and the principal open-formations (caatinga, cerrado and Chaco). Other major areas are covered in less detail. This minor flaw is far outweighed by the opportunity to have in one place a summary of the thoughts of the leading authority on South America’s lizard biogeography. Vanzolini concludes that the basic patterns were established during Tertiary (Mi-Pliocene) and many species date from that period (others however are products of Quaternary climatic cycles), that wide-ranging taxa are the exception and that in situ speciation within major domains is the rule.

The final paper in the proceedings, A New Look at the Iguania by E. E. Williams, encompasses a much wider range than any of the others, forming an attempt to analyze the phylogeny, biogeography and evolutionary processes responsible for differentiation in a major clade of lizards. While this effort seems somewhat far afield from the central issues of the workshop, it is of considerable value to have this summary of Williams’ ideas on these subjects. After all, he has been deeply immersed in the study of one of the largest components of this group (the anoles and their allies) for over 30 years. Because of the space limits for this review only a few of the most important features of the New Look are touched upon here. Williams’ phylogenetic analysis is based upon 13 features (out of 49) utilized by Etheridge and de Queiroz (1988) and two additional scale features. He concludes that the Iguania are comprised of a Gondwanan clade (morunosaurs/Polychrus, anoloids, opilurines and chameleons) and a Laurasian one (all other iguaninians, including agamids). He regards anoloids as being the sister group to chameleons and opilurines, which are in turn sister taxa. These proposed relations are based primarily on post-xiphisternal inscriptive rib conditions, sensory scale organ similarities and ulnar nerve position. These views are now placed in considerable doubt by the more recent rigorous cladistic analysis (67 characters) of Frost and Etheridge (1989), who conclude that “agamids” and chameleons are sister taxa and not particularly closely allied to opilurines or anoles.

Williams found, as did Frost and Etheridge (1989) that numerous apparent homoplasies make resolution of relationships among the major subdivisions in the Iguania difficult. He argues that a rule of Geographic Contiguity may be “at least as valuable as parsimony (or compatibility) in evaluating homoplasy, i.e. homoplasy may be rejected as an explanation of character incongruity when evidence suggests that the clades in question have been contiguous or sympatric at or near their time of origin. It is partially this rule that led Williams to propose the anoloid, opilurine and chameleon relationship. In light of the work of Frost and Etheridge (1989), this idea seems to have little merit in explaining character distributions in higher taxa. It also appears, in the example given by Williams, that his choice from among several possible homoplasies as to which are indicative of relationships is subjective. Nevertheless the concept that the geographic distribution of character states may be important to phylogenetic analysis needs to be explored on a wider basis.

LITERATURE CITED


JAY M. SAVAGE
Department of Biology
University of Miami
P.O. Box 249118
Coral Gables
Florida 33124, USA
HERPETOLOGICAL REVIEW EDITORIAL POLICY

The following statement-of-purpose appeared in the Introduction to the first issue of Herpetological Review in 1967 (Corson Hirschfield, Editor):

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