ANAX 2 (1): 41-46 Abstracts of Papers presented at the Second Odonatological Symposium of the Alps-Adriatic Regional Community Deutsch-Wagram (near Vienna), Austria, July 14-18, 1996 1999

BIOLOGICAL DIFFERENTIATION AND REPRODUCTIVE ISOLATION OF SYNTOPIC CENTRAL ITALIAN POPULATIONS OF *CHALCOLESTES VIRIDIS* (VANDER L.) AND *C. PARVIDENS* (ARTOBOL.) (ZYGOPTERA: LESTIDAE).

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Populations of *C. viridis* and *C. parvidens* coexist in syntopy in at least one pond near Rome, Italy, where they generate both pure and hybrid offspring. The specific status of the two taxa was recently recognised on the basis of electrophoretic assays (COBOLLI et al., 1994, *Atti 17° Congr. naz. ital. Ent.*, pp. 77-82). A preliminary investigation has shown that different activity periods of the two syntopic populations probably help in keeping them isolated. Further investigation of large samples from both syntopic and allotopic populations has confirmed an average genetic distance between the two taxa at a specific level (D_{NEI} = 0.586 – 7 diagnostic loci out of 16 checked) and the seperation of activity periods at the pond, with peaks at noon and at 14.00 h in *C. parvidens* and *C. viridis*, respectively. F-1 hybrid specimens, heterozygous in all diagnostic loci, represent 4.7 % of the overall sample, the same as the percentage of heterospecific tandems (4.6 %; females were identified by electrophoresis). The males of the two taxa do not only differ in the shape of the cerci, but also in the shape of the inferior anal appendages and of the profallus. F-1 hybrids have cerci of intermediate shape, while in F-n hybrids, the cerci resemble those of either parents. Last instar larvae differ in the shape of the proximal segment of the labial palpus, which shows a larger denticle in *C. viridis* than in *C. parvidens*. Total body length of syntopic *C. viridis* is significantly larger than that of syntopic *C. parvidens*. Not so total body length of allotopic populations of *C. viridis* from central Italy, while a sample of *C. parvidens* from Greece averages significantly larger than a sample of *C. viridis* from Spain. In the syntopic populations, examined tandem males averaged a larger body length than unpaired mailes, although the difference was significant ($P < 0.01$) only in *C. parvidens*.

In 1995, emergence was recorded between June 2 – July 28 in *C. parvidens* and between June 28 – July 28 in *C. viridis* with curves peaking on June 23 and July 21, respectively. Countings of exuviae, collected on three non-consecutive days every week, gave a total of 1977 males and 1664 females (male : female ratio = 1.2: 1; $x^2 = 26.7$; $P < 0.01$) of *C. parvidens* and 292 males and 355 females (male : female ratio = 0.8: 1; $x^2 = 5.9$; $P < 0.01$) of *C. viridis*. The prereproductive period lasted roughly 8 weeks in *C. parvidens* (that emerged earlier) and 5 in *C. viridis* (that emerged later). All throughout the prereproductive and reproductive periods, *C. parvidens* was much more abundant than *C. viridis*. From the above, the two syntopic populations appear biologically well differentiated, although some genetic compatibility does occur. In the period of the day in which both species are active at the pond, the probability of meeting females is grater for *C. parvidens* males, since these are in larger numbers than *C. viridis*. However, the likelihood of mixed copulations is greatly reduced by different shapes of male anal appandages. Furthermore it is possible that in seizing *C. viridis* females, the *C. viridis* male's greater size enables it to outcompete the male of *C. parvidens*, this compensating for the greater probability of the latter of meeting these females. Thus in syntopy, the different size between the males of the two species might also represent a mechanism which enhances reproductive isolation.

NICHE OVERLAP, NICHE SEGREGATION AND HABITAT SELECTION IN *SOMATOCHLORA ARCTICA* (ZETT.) AND *S. ALPESTRIS* (SEL.) IN SWITZERLAND (ANISOPTERA: CORDULIIDAE)

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In various regions of central Europe the sibling species *S. arctica* and *S. alpestris* geographically overlap. This raises the question how far the ecological niches overlap or differentiate, respectively. The question was investigated in Switzerland by collecting ecological data on the larval habitats, by experiments on habitat selection and by exploiting the corresponding data from the literature available.

S. arctica is recorded at ca. 90 localities. 83 % of them are situated in the Alps, 6 % in the Midlands and 11 % in the Jura mountains. *S. alpestris* is found at more than 300 localities almost exclusively restricted to the Alps. The larval habitats of *S. arctica* are situated between TL (thermic levels sensu SCHREIBER, 1977, *Wärmegliederung auf Grund von phänologischen Geländeaufnahmen in den Jahren 1969 bis 1973.* Eidg. Justiz- und Polizeidepartement, der Delegierte für Raumplanung) 4 und 10 (mainly TL 4-8) and those of *S. alpestris* between 1 and 8 (mainly 1-4). With respect to vertical distribution, the two species overlap especially at TL 4 and 5 where they inhabit moorland biotopes. Isolated populations of *S. arctica* exist at 40 localities, of *S. alpestris* at 170 localities, whereas the two species coexist at 36 places. Sometimes the larvae of *S. arctica* and *S. alpestris* even develop successfully in the same miniature water body. At TL 4 and 5 emergence and flying season of *S. arctica* begin two to four weeks earlier than in *S. alpestris*.

Both species exist exclusively in waters which lack fish, are partly or completely overgrown by aquatic vegetation and covered with peat mud on the ground. The larvae of *S. arctica* prefer shallower waters than those of *S. alpestris*. In contrast to *S. arctica*, the latter inhabits also the shore of small lakes and little streams as long as their bottom is at least partly covered by organic matter. Hydrochemical parameters and the vegetation structure of the breeding sites of both species are very similar. Those of *S. arctica* are characterized by three and those of *S. alpestris* by seven different plant communities. For *S. arctica* the Caricetum limosae is most important, for *S. alpestris* the Caricetum fuscae, the Caricetum limosae and the Caricetum rostratae. Above the treeline only *S. alpestris* remains. It is eurytopic and breeds in any type of habitat as long as aquatic vegetation and organic mud ground are present.

The cues influencing habitat selection of *S. arctica* and *S. alpestris* were tested by field experiments using dummies of different materials. Both species react most intensely on dark brown perspex and black plastic foil, whereas aluminium foil is completely avoided. The reactions of both sexes are evoked by reflected polarized light with horizontal e-vector. No differences between *S. arctica* and *S. alpestris* were found with respect to behavioural aspects of habitat selection. Both species take even very small dummy areas for oviposition sites.

In spite of these similarities there are gradual differences between the ecological niches of the species with respect to several factors, where climatic features (heat sum) and size of larval habitat are the most important. At places where *S. arctica* and *S. alpestris* occur syntopically competition arises between the two species. It is suggested that the contest is held rather on the imaginal than on the larval level. *S. alpestris* is considered superior.

THE OCCURENCE OF THE VAGRANT EMPEROR (*HEMIANAX EPHIPPIGER*) IN MIDDLE EUROPE 1995

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Between end of May and end of August the most widespread occurrence of the Vagrant Emperor (*Hemianax ephippiger* Burmeister) in middle europe was recorded. Observations were made in Switzerland (WILDERMUTH, in lit.), Austria (RAAB & LAISTER, in lit.), Slowenia (KOTARAC & PIRNAT, pers. comm.), Hungary (AMBRUS, pers. comm.), Ukraine (GORB, 1996, *Notul. odonatol.* 4: 123), Poland (BERNARD & MUSIAL, 1995, *Opusc. zool. flumin.* 138: 1-9), Germany, the Netherlands (DIJKSTRA, DINGEMANSE & EDELAAR, 1995, *Libellennieuwsbrief* 5: 6-7), England (PAINE, 1995, *J. Br. Dragonfly Soc.* 11: 46-48), Denmark (HOLMEN, in lit.), Sweden (OTTVALL, 1996, *Nord. Odonat. Soc. Newsl.* 2: 23) and Norway (OLSVIK, 1996, *Nord. Odonat. Soc. Newsl.* 2: 24, NIELSEN, in lit.). German observation sites were near Karlsruhe (STERNBERG, pers. comm.) and Offenburg (HEITZ, in lit.), at Paderborn (Northrhine-Westfalia) (HAHN, pers. comm.), in Thuringia (KIPPING, 1995, *Mauritiana* 15: 383-384), Brandenburg (GÜNTHER, pers. comm.) and Bavaria (BURBACH 1995, *Hagenia* 10: 15-16).

In Bavaria 108 records at 72 localities with a total of 249 individuals were made between the 20th of June and the 18th of August 1995. The distribution of the records depended on the field activities of informed specialists. Concentrations were recorded in the danube valley (BORSUTZKI, LEINSINGER & SCHÖN, pers. comm), in middle Franconia near Nürnberg (SCHOTT & WERZINGER, pers. comm), and in the north of Munich around Freising (BURBACH & WINTERHOLLER). At four localities oviposition could be observed, but because of rather bad weather from August onwards develepment could not be proven. Since there were at least 5 records of *Hemianax ephippiger* in 1996 close to the 1995 sites, it seems possible that the larvae did overwinter and emerged in early spring 1996.

Correlations between the "invasion" and the weather conditions during the observation period are discussed. There is strong evidence that the influx originated in the (south)east and started in the end of May. First observations were made on 30.5. 1995 in Ukraine and Poland, followed by the records in Austria and Brandenburg in early June. Because of bad weather from end of May to the 19th of June in the more westerly parts of Europe the first observations were on the 20th of June. Since the weather conditions in summer 1995 were good in the eastern part of Europe, development was possible in Poland (BERNARD & MUSIAL, 1995), Slowenia (KOTARAC & PIRNAT, pers. comm.) and Hungary (AMBRUS, pers. comm.), as well as in one of the warmest regions of Germany, in the upper Rhine valley near Karlsruhe (STERNBERG, pers. comm.).

GOMPHIDEN IM BERGLAND – ZUM VORKOMMEN VON *GOMPHUS VULGATISSIMUS* UND *ONYCHOGOMPHUS FORCIPATUS* IM BEZIRK KUFSTEIN, N-TIROL

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Größere Fließgewässer im Bergland bieten Libellen keine geeigneten Lebensräume, die typischen Bäche, Achen und Flüsse im Innern der Alpen sind praktisch libellenfrei. Gründe dafür sind die zumindest periodisch auftretenden, reißenden Strömungsverhältnisse und ganzjährig niedrige Temperaturen. Ausnahmen stellen nur die Abflüsse von Seen und Mooren dar, deren Wasserkörper ausgleichend auf die Dynamik der Wasserführung und positiv auf die Wassertemperatur wirken. Weiters ermöglicht die ökologische Plastizität mancher rheophiler Libellenarten die Besiedlung sandiger bzw. schottriger Uferbereiche (meist größerer) Stillgewässer.

Insgesamt bleiben aber alle typischen Fließwasserlibellen mit Ausnahme der Quelljungfern im Untersuchungsgebiet eher seltene Arten. *Gomphus vulgatissimus* und *Onychogomphus forcipatus* sind die einzigen in N-Tirol bisher nachgewiesenen Vertreter der Gomphiden und stellen gewissermaßen lokale Raritäten dar, deren aktuelle Vorkommen und die dabei erhobenen Beobachtungsdaten darzustellen sich lohnte.

Für *G. vulgatissimus* sind im Untersuchungsgebiet 6 aktuelle Fundorte bekannt, davon 2 bodenständige, individuenstarke Populationen (Thiersee, Hechtsee), 3 autochthone Vorkommen in mittlerer Zahl (Seebach vom Reintalersee in den Krummsee, Walchsee im Abflußbereich, Baggersee bzw. Fischteich Langkampfen), sowie 3 Fundorte mit Einzelfunden ohne Bodenständigkeitsnachweis. Es werden aufgrund der aufgesammelten Exuvien (n = 884) Angaben zum Schlupf (Ort, Phänologie, Geschlechterverhältnis) gemacht, weiters Höhenverbreitung und Flugzeit dargestellt. Von *O. forcipatus* sind im Untersuchungsgebiet nur 2 Vorkommen bekannt, eines in größerer Individuenzahl (Seebach vom Reintalersee in den Krummsee), sowie eines in mittlerer Individuenzahl (Walchsee im Abflußbereich). Auch für diese Art werden aufgrund der aufgesammelten Exuvien (n = 148) Angaben zum Schlupf gemacht, aber auch Höhenverbreitung und Flugzeit werden dargestellt.

THE BAVARIAN DRAGONFLY - ATLAS; CONCEPTION, DATABASE AND STAND OF WORKING

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The Bavarian State Office for Enviromental Protection and the „Bund Naturschutz in Bayern" plan to publish an atlas of dragonflies in 1997. The text format and preliminary results were shown.

Bavaria is the southeasternmost federal state and covers about 20 % of the surface of Germany (= 70547 km^2). From this area, approximately 90.000 records from 14.500 localities are stored in a main-frame data bank. Due to the number of sites investigated, dragonflies are the best-known invertebrate group in Bavaria. 74 species are recorded with 62 of them breeding regularely, 7 of them breeding temporarily, two as occasional guests without breeding status and three classified as extinct without information on former development. The fourth "extinct" species, *Epitheca bimaculata* has been rediscoverd in the meantime (Hess, Hecks & Schön, 1996, *Libellula* 15: 27-44). According to the actual Red List (Kuhn, 1992, *Schriftenreihe Bayer. Landesamt für Umweltschutz* 111: 76-79), 16 species are in danger of extinction, 11 are seriously endangered, 11 endangered, 6 potentially endangered and eight species are irregular guests. Only 18 species are not endangered.

Over-proportional high numbers of endangered species are restricted to the mineral-bogs/reed-beds, rised bogs, streams, ditches and springs. With more than 3000 localities, 12 species are estimated as highly common, 7 species as very common, 14 species as common (> 1500 loc.), 14 species as moderately common (> 500 loc.), 21 species as rare (> 100-500 loc.), 11 species as very rare (> 25-100 loc.) and nine species as extremely rare (< 26 loc.). First analysis of population trends showed a decrease for a large extent of species. This applies for example to the almost extinct species *Coenagrion lunulatum, Leucorrhinia caudalis, L. albifrons*, the very rare *L. pectoralis* and *L. rubicunda*, the rare species *Sympecma paedisca, Lestes virens, Somatochlora alpestris, Libellula fulva* but also to moderately common species as *Coenagrion hastulatum, C. pulchellum, Sympetrum flaveolum*. Over-proportional increases in records can be observed in *Anax imperator*, southerly distributed species such as *Crocothemis erythraea* and *Aeshna affinis*, westmediterranean species extending their area to the east such as *Cercion lindenii* and *Gomphus pulchellus*, but also in riverine species as *Calopteryx splendens, C. virgo* and probably *Gomphus vulgatissimus*. Finally, distribution maps and graphs with selected examples of phenology, altitudinal distribution and sozialization data were presented.

THE „DRY SEASON" ASPECT OF THE ODONATE FAUNA OF SRI LANKA

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In the introduction, the geographic position of Sri Lanka and its climate are outlined. Although Sri Lanka as a whole has a high rainfall and there is practically no month without some rain, January and February, the months when the author in 1995 had the opportunity to study the dragonfly fauna of the island, can be considered as „dry months", at least in the central and southwestern part of Sri Lanka, which are not affected by the north-east monsoon.

The history of odonatological research in Sri Lanka is briefly evidenced and an account on the odonate fauna of Sri Lanka as a whole and its zoogeographical position is given.

In addition, some characteristic biotopes and their dragonfly fauna are presented. The species recorded at the lowland irrigation water tanks and paddy fields are not of much interest, consisting mostly of widespread oriental species, mainly libellulids and coenagrionids. As most of the species confined to Sri Lanka (the percentage of endemics on the species and subspecies level is approximately 45%) inhabit lotic waters, more attention is devoted to this biotope type. Although January and February are not the best months for studying dragonflies, some interesting species of the families Protoneuridae and Chlorocyphidae could be recorded. The dragonfly fauna of the Sinharaja Forest (included in UNESCO's list of World Heritage Sites) is briefly discussed.

Finally the author points out the need for serious inventoring work, which, especially in the areas with endemic flora and fauna, becomes more and more imperative.

PHILIPPINEN, ODONATOLOGISCHE FELDFORSCHUNG IM TROPENWALD

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Einleitend werden Lage, Grösse und Struktur der Philippinen dargestellt, wobei auch auf die Klimaunterschiede zwischen Flachland und Bergland ebenso wie auf die ausgeprägten Regen- und Trockenzeiten hingewiesen wird.

Der erste Teil des Diavortrags behandelt die Verbreitung der Arten bzw. Artengruppen in den verschiedenen Regionen, zoogeographische Aspekte sowie charakteristische Biotope und Habitate. Anschließend werden die Auswirkungen der Umweltzerstörung auf die Fauna im Allgemeinen und die Odonaten im Besonderen diskutiert. Die Probleme des Schutzes wertvoller Biotope und die tragischen Entwicklungen in den staatlichen Nationalparks werden aufgezeigt.

Abschließend werden die Schwierigkeiten odonatolgischer Feldforschung in Tropengebieten diskutiert. Praktische Tips aus den langjährigen Reiseerfahrungen des Referenten für die Konservierung von Sammelgut in feuchtheissem Klima, besonders auch der Schutz der Ausbeute vor Schädlingen wie Ameisen, Fliegen und Käfern können eventuellen Tropenreisenden nützlich sein.

LIBELLENDIAS AUSGEWÄHLTER EUROPÄISCHER ARTEN

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In zwei Präsentationen werden Dias europäischer Libellen vorgestellt. Der erste Abschnitt umfaßt Arten des Mittelmeerraumes, der zweite Mitteleuropa. Insgesamt werden 52 Arten vorgestellt. Besonders erwähnenswert sind Flugaufnahmen von *Anax imperator*, *Aeshna affinis*, *Aeshna cyanea*, *Libellula depressa* und *Sympetrum sanguineum* sowie ein Paarungsrad von *Crocothemis erythraea* über einem Reisfeld. Libellen

als Beute, wie z.B. Kannibalismus bei *Ischnura elegans* oder *Enallagma cyathigerum* als Beute einer Sandlaufkäferlarve, werden ebenfalls vorgestellt. Neben extremen Makroaufnahmen von *Erythromma viridulum*, *Lestes dryas*, *Lestes barbarus*, *Aeshna juncea* und *I. elegans* seien auch Bilder von seltener anzutreffenden Arten wie z.B. *Coenagrion ornatum*, *Boyeria irene*, *Selysiothemis nigra* und *Epallage fatime* erwähnt. Auch Bilder wie z.B. neun Exuvien an einem Schlüpfsubstrat oder sieben *Aeshna mixta* an einem Zweig werden den meisten Zuschauern wohl länger in Erinnerung bleiben.

THE RED LIST OF DRAGONFLIES IN LOWER AUSTRIA

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A Red List of Odonata with details on distribution patterns, abundance, habitat choice and management will be published in 1997 as a book. The list will include species that are rare or have decreased. We compare two periods: before 1980 and 1980 to 1995. The former and the actual distribution in Lower Austria are presented. In both periods a sufficient high number of species has been observed and in the database of ÖAL 3.614 records for Lower Austria are included.

Why Red Lists? – to inform people and, in particular, competent authorities that certain species are threatened, – to form a base for detailed species management plans and research, – to be used as a tool in the designation of priority areas or landscapes for conservation and management.

DIE ODONATEN VON MICRONESIEN (PAZIFIK)

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Einleitend werden Lage, Grösse und Struktur von Micronesien dargestellt, wobei auch auf die spezifischen Klimabedingungen hingewiesen wird. Im Diavortag werden vor allem einige typische Arten bzw. Artengruppen sowie charakteristische Biotope und Habitate vorgestellt.