common, as well as large shark remains (Fig. 25) and crustaceans (BACHMAYER & TOLLMANN 1953).

An exceptional "Fossillagerstätte" occurs at St. Margarethen in Burgenland (Fig. 22), where an excellently preserved fish fauna occurs (SCHULTZ 1993, CHANET & SCHULTZ 1994) in fine-grained, partly laminated, marly limestones. Besides scorpenids (Fig. 25), the oldest known parrot fish is also recorded from here (BELLWOOD & SCHULTZ 1991). The depositional environment was recently interpreted as very shallow marine, partly representing a flooded intertidal flat (PILLER et al. 1996).

Miocene Primates from Austria

(GUDRUN DAXNER-HÖCK)

Catarrhine primates came from Africa and appeared for the first time in Europe at the end of the Early Miocene. They had a wide distribution across Western and Central Europe and Southwest Asia during the Middle and Late Miocene.

In Austria their existence has been demonstrated in the Molasse Zone in Upper and Lower Austria, as well as from the Vienna basin northeast and southeast of Vienna, and in the "Lavanttal" (Carinthia) and Aflenz Basin (Styria), which

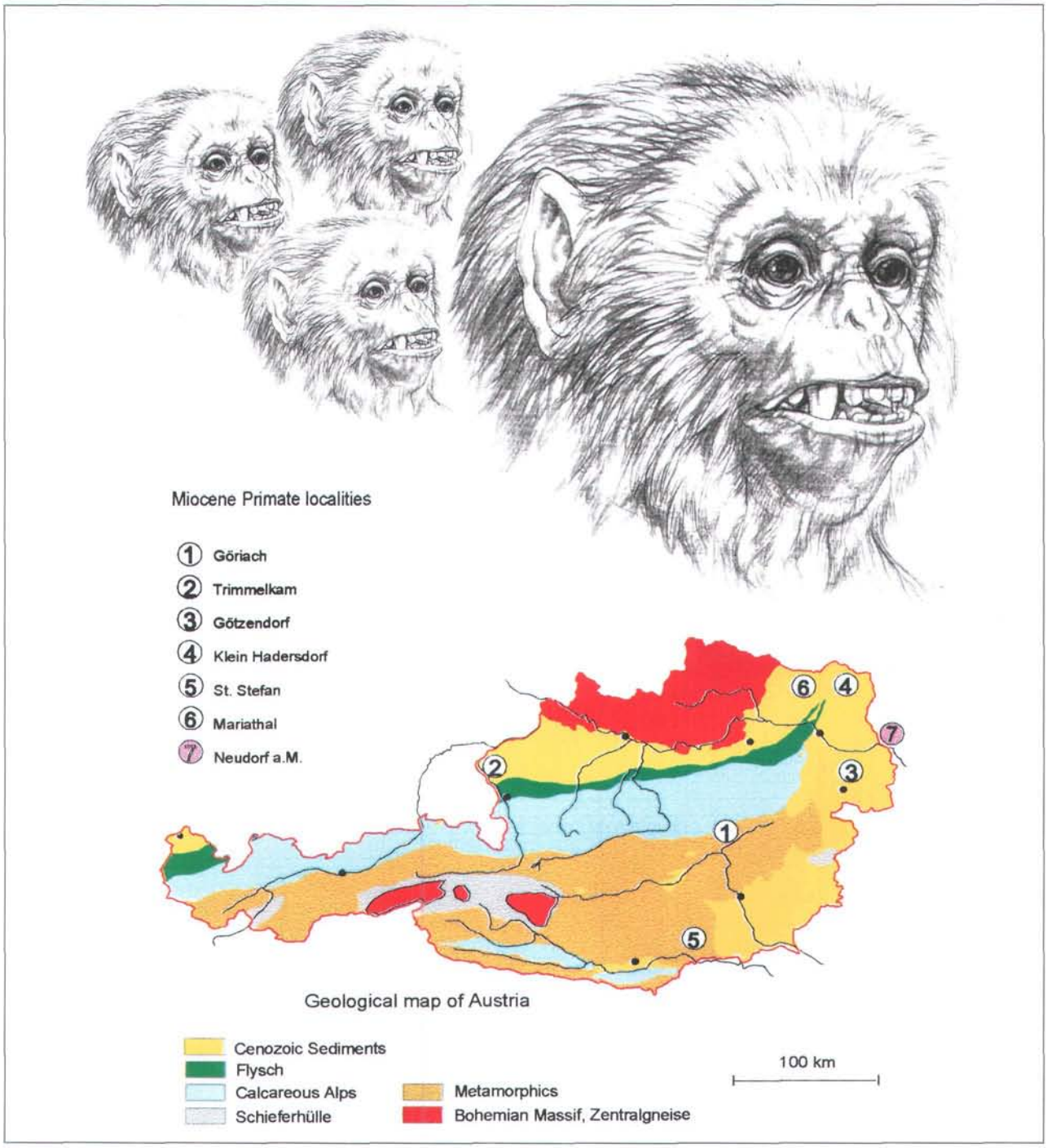

Fig. 26
Geographical position of Miocene primate localities from Austria and Slovakia.

Table 1
Basic data on Miocene Primates from Austria.

Miocene Primates from Austria						
	age	**locality**	**lithology**	**figure**	**collection**	**main references:**
						ANDREWS et al. 1996
Pliopithecidae						and ZAPFE 1969
Pliopithecinae						
***Pliopithecus platyodon* BIEDERMANN 1863**	Badenian	Göriach, Styria	lignite	fig. 1/1	NHMW, MJOG,	
* *Hylobates antiquus* GERVAIS	MN 6 ?				MOUL, PMBE,	* HOFMANN 1893
					NHMB	
Crouzeliinae						
***Plesiopliopithecus lockeri* ZAPFE 1961**	Badenian	Trimmelkam, Upper Austria	lignite	fig. 1/2	MHNS	
* *Pliopithecus (Plesiopliopithecus) lockeri*	MN 6 ?	(type locality)				* ZAPFE 1961
***Anapithecus hernyaki* KRETZOI 1975**	Pannonian	Götzendorf, Lower Austria	sand,	fig. 1/3	NHMW,	
* *Dryopithecus brancoi* (SCHLOSSER)	MN 9		fluvial		SCHW	* ZAPFE 1989
Hominidae						
Dryopithecinae						
***Griphopithecus darwini* (ABEL 1902)**	Badenian	Klein Hadersdorf, Lower Austria	sand,	fig. 1/4	PIUW	
* *Austriacopithecus weinfurteri*	MN 6 ?		delta			* EHRENBERG 1937
* *Austriacopithecus abeli*						* EHRENBERG 1937
***Dryopithecus carinthiacus* MOTTL 1957**	Sarmatian	St. Stefan , Carinthia	lignite	fig. 1/5	LMKK	
* *Dryopithecus fontani carinthiacus*	MN 8 ?	(type locality)				* MOTTL 1957
***Dryopithecus carinthiacus* MOTTL 1957**	Pannonian	Mariathal, Lower Austria	sand,	fig. 1/6	PIUW	
* *Dryopithecus brancoi* (SCHLOSSER)	MN 9		fluvial			* THENIUS 1982

Abbreviations:

NHMW - Naturhistorisches Museum, Wien (A)
NHMB - Naturhistorisches Museum, Basel (CH)
MHNS - Haus der Natur, Salzburg (A)
MJOG - Landesmuseum Joanneum, Graz (A)
MOUL - Montanuniversität, Leoben (A)
SCHW - Coll.Schwengersbauer, Mannersdorf (A)
PIUW - Paläontol. Inst. Univ., Wien (A)
LMKK - Kärntner Landesmuseum, Klagenfurt (A)
PMBE - Paläontologisches Museum, Berlin (D)

* first description

are two intramontane basins in southern and central Austria (Fig. 26/1-6, Table 1). Six Austrian vertebrate faunas have been recorded from lignite mines, river sediments and delta deposits, which yielded fossil primate remains. There is some evidence that only one species is present in each site. The lignite deposits from Trimmelkam, Göriach and St. Stefan represent swampy forest areas, in which pliopithecids or hominids lived. The sands of Klein Hadersdorf are interpreted as delta sediments. They contained hominid limb bones. The faunas of Götzendorf and Mariathal yielded pliopithecid and hominid remains, respectively. These were imbedded in sands, which characterize a marginal fluvial environment. Special mention must be given to two famous primate localities of Devinska Nova Ves (Neudorf a. d. March) from Slovakia, which are situated close to the easternmost border of Austria (Fig. 26/7). The type locality of *Pliopithecus vindobonensis* stems from this area. It is the well-known fissure "Neudorf Spalte". A few teeth of *Pliopithecus antiquus* and *Griphopithecus darwini* were located in the marine sands of "Neudorf-Sandberg", which is a second site of the Devinka Nova Ves area (ANDREWS et al. 1996).

In Austria some primate species are represented by isolated teeth only: *Anapithecus hernyaki* from Götzendorf and *Dryopithecus carinthiacus* from Mariathal. *Dryopithecus carinthiacus* from St. Stefan and *Plesiopliopithecus lockeri* from Trimmelkam have been identified by jaws, while *Pliopithecus platyodon* from Göriach is based on an extensive collection of jaws, skull fragments and isolated teeth which originated from at least ten individuals (ZAPFE 1969). Although postcranial hominid remains are generally rare, *Griphopithecus darwini* from Klein Hadersdorf is documented by a humerus and an ulna only.

According to the European record, the extinct primates – the pliopithecins, the crouzeliins and the dryopithecins – ranged in Austria from the Middle to the Late Miocene. Their first records were in the Badenian, i. e., *Pliopithecus platyodon* from Göriach, *Plesiopliopithecus lockeri* from Trimmelkam and *Griphopithecus darwini* from Klein Hadersdorf. *Dryopithecus carinthiacus* from St. Stefan is of Sarmatian age. *Anapithecus hernyaki* from Götzendorf and *Dryopithecus carinthiacus* from Mariathal were recorded for the last time in the Pannonian.

The Cave bear: Gentle Giant of the Alps

(DORIS NAGEL, GERNOT RABEDER)

Large quantities of fossil teeth and bones have been found in caves throughout Europe, from the Pyrenees to the Urals and from the Abruzzen to the Harz mountains. They belong to a type of bear, which differs from the living brown bear in many aspects and was classified in 1794 as a separate species – *Ursus spelaeus* – the cave bear.

The cave bear is mainly a European speciality. More than 30 cave bear sites are known in Austria alone (DÖPPES & RABEDER 1997; Fig. 27) and some of these caves are situated at an altitude of 2,000 m or more (Salzofen, Ramesch-Knochenhöhle, Brettstein, Brieglersberg, Schreiberwand-Höhle, etc.).

The abundance of cave bear remains and the possibility of radiocarbon dating, as well as uranium-series dating, allow us to deal with this extinct animal both zoologically and palaeontologically. Questions like biostratigraphy, palaeobiogeography, palaeoclimatology, mode and speed of evolution, way of living (hibernation, food preference), sexual dimorphism, size variation and interaction with humans can now be answered. A short summary is given here.

The evolutionary line from *Ursavus* to *U. etruscus* to *U. deningeri* leading to *U. spelaeus* is well documented in Austrian caves and sites (Fig. 27). The cave bear weighed up to 900 kg and thus was larger than any living bear today (Fig. 28). The increase of cusps per tooth and the enlargment of occlusal surfaces – suited to grinding functions – is an adaptation to a herbivorous way of live. The rapid evolution from an omnivorous ancestor to a herbivorous cave bear, documented in various sites and profiles, took less than 150,000 years: Radiocarbon and uranium-series dates constrain these palaeontological results. This evolutionary speed is unrivalled among mammals.

In some cases up to 92% of the pollens found in caves are from Asteraceae. We assume that these are remains of the cave bear diet, which passed the digestive system (e.g., *Armeria, Artemisia, Centaurea, Geranium, Knautia, Scabiosa* and *Trifolium*).

The only herbivorous bear today is the Great Panda but it inhabits areas with a temperate climate. The cave bear had to face long winters. There are only two solutions to this problem: migration or hibernation; the cave bear chose the latter, which saved him about 95% of the needed energy. The abundance of cave bear bones in caves are mostly the remains of individuals, which did not survive the winter. This frequent occurrence and their statistical relevance make the cave bear the most important animal in mammalian palaeontological evolutionary research.

Cave bears had an obvious accentuated sexual dimorphism, in which females were about 15% smaller than males. Measurements of the canines prove not only this difference in size but also the male/female distribution in the fossil sites: it is nearly equal, with slightly more females. This corresponds with the results of studies concerning recent brown bear populations.

The coincidence of cave bears with Palaeolithic stone artefacts left by humans only proves a mutual interest in caves as a shelter and it is unlikely that the caves were inhabited simultaneously. The excavations of over 20 caves in Austria, with thousands of fossil teeth and bones revealed no evidence so far to substantiate the "cave bear cult" (BÄCHLER 1923, 1940, PACHER 1997).

Figs. 27 + 28 see next page

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