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Front cover: The archosaur *Vjushkovia*, a relative of the South African fossil *Erythrosuchus*. This skull was collected in Middle Triassic sediments of China.

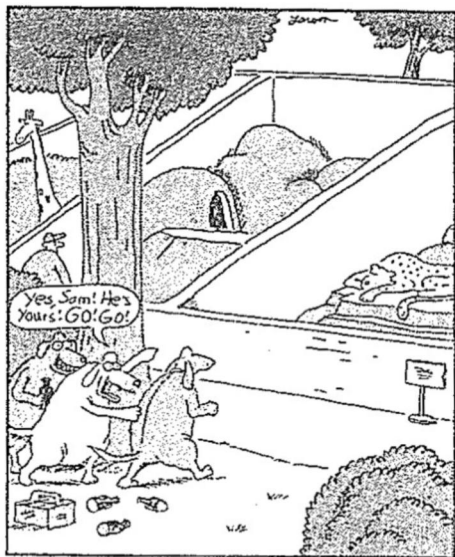
FROM THE EDITOR

Dear Pal people

I hope and trust all is well with everyone as the end of the century and the millenium approaches (That is if you accept that the calender began in the year 0, which will make 1 January 2000 the start of the new millenium. However if, as various sources seem to do, you take AD 1 as the start of our calender, then the new millenmium only begins at the beginning of 2001!) Maybe the best is to accept both, and in that way one can have two big celebrations!

Thanks to all the contributors to this issue, as usual we have some interesting news and research reports. Johann Neveling, our new assistant editor, has done most of the work for this issue so good on you Johann and thanks - I am afraid I'm right in the middle of trying to tie up the final preparations for a thesis submission (rather me than you guys hey!).

All the best and take care!
Patrick



Dogs and alcohol: The tragic untold story

NEWS FROM:
BOB BRAIN, TRANSVAAL MUSEUM

Although the objective of my current project remains the same - to find fossil micro-invertebrates from lineages ancestral to the Cambrian radiation in Proterozoic limestones of Namibia, the focus has shifted for the time being from the Nama to the Otavi Group. The reason is that I have been fortunate enough to find some phosphatised microfossils in the Otavi, which I had not been able to do in the Nama limestones, despite an exhaustive (and exhausting) search. On the initial advice of Bill Schopf, my Nama project concentrated on glassy black cherts, which actually proved to be extremely rare, and I was talking about some early results at a conference in Windhoek in August 1994 when a geologist from the Tsumeb Corporation, Clive King, remarked that he could show me such cherts in an Otavi limestone. I went with him at once and he took me to outcrops of black, foetid limestones, with black chert bands in the T7 Hüttenberg Formation of the Otavi Group at Tschudi near Tsumeb. Laura made me thin-sections of the chert, but we did not see anything exciting in them. So there the matter rested while I went back to the Nama. Then, late in 1997 we were in Etosha and I decided to return to Tschudi to get some more samples. On the way, we passed the isolated dolomite hills rising out of the flat Etosha basin at Halali and I grabbed a few samples of black foetid limestone from the roadside, very similar in appearance to those of Tschudi. The difference was that these contained beautifully preserved microfossils of a small sponge-like organism that had been phosphatised. So last November I returned to Halali and looked in detail at the carbonate sequence preserved as an isolated outlier of the Otavi mountainland sequence, finding that the fossiliferous limestone forms a layer about six metres thick in a 100m dolomite profile. The samples that I collected there contained, not only the sponge-like organisms that I plan to describe as *Otavia minuta*, but also some beautiful bivalves, oval in shape and each 1-1,5mm across. These are generally preserved as separate valves, although we have about a dozen specimens so far with both valves articulated, enclosing phosphatised endocasts or steinkerns. A point of particular interest is that

the fillings of many of the separate valves preserve some detail of internal structure, particularly in the form of button-shaped "egg-cases" which became surprisingly large before they were shed. Once shed, they then exhibit a series of stages leading to a new bivalve condition, which does not seem typical of either brachiopods or molluscs, so what the affinities of these strange shells, which I plan to describe as *Halalia otaviensis*, will turn out to be remains uncertain.

In view of the particular interest of these fossils, it became imperative to tie the Halali outlier carbonate sequence into that of the main Otavi mountainland, which is particularly well known, on account of the important mines in the area. So in April this year I met up with two geologists at Tsumeb who know the area well, - K.-H. (Charlie) Hoffmann of the Geological Survey and Arno Günzel who had been the geologist at Tsumeb mine until its closure. They pointed out that the only limestones present in the Tsumeb Subgroup dolomite sequence are in the Maiberg Formation, just above the Ghaub glacial deposits and in the T7 zone of the Hüttenberg Formation, close to the top of the succession. Of these two possibilities, only the latter limestones are foetid, like the Halali one. Nevertheless, numerous samples were taken from all layers and these are being investigated at present. As I write this, we already have two Hüttenberg limestone exposures, on the northern fringe of the Otavi mountainland, in which the microfossils also occur, though I have not yet been able to find them in the limestones from the Tsumeb mine itself.

The burning question remains: how old is the Tsumeb Subgroup sequence relative to the Nama with its Ediacaran-type fauna? The consensus opinion seems to be that the top of the Hüttenberg Formation is separated from the base of the Nama by at least one glacial episode. Whether this episode was as severe as that represented by the Ghaub tillite that resulted in the "Snowball earth" remains to be seen. The investigation continues

ANUSUYA CHINSAMY-TURAN, S A MUSEUM & UCT

It's been a while since I've written and am not really sure where to begin. Perhaps a good place is to say that I am now a mother of two boys: Evren, aged 3 years and Altay who is 1 year old. Since March 1997, the University of Cape Town has employed me, although by agreement I spend at least 50% of my time at the SA Museum. I therefore have the best of both worlds - access to students through teaching as well as guaranteed research time! Its been working really well and I am enjoying having this "split" personality!

Besides my contribution to the gene pool, I have managed to also continue my research on the bone microstructure of various extinct and extant vertebrates. Tom Rich, Pat Vickers-Rich and I have completed a study on the bone microstructure of the Dinosaur Cove hypsilophodontids and Timimus. Our finds were quite exciting and have resulted in several publications (see below). I have also been continuing my research on Cretaceous bird bone microstructure. Last year, Larry Martin, Kansas University, Peter Dodson, University of Pennsylvania and I worked on the Cretaceous ornithurine birds *Hesperornis* and *Ichthyornis* from Texas, and the Antarctic loon (see below). Several modern taxa such as loons, grebes and penguins were used for comparative purposes. One of the exciting projects I've had the privilege of collaborating on has been the embryonic sauropod dinosaurs from the Late Cretaceous of Patagonia, Argentina (see below). This incredible find received tremendous media coverage and the collaborative effort of various researchers has led to a better appreciation of the taphonomy and palaeobiology of these dinosaurs.

Currently, I am working on Cretaceous birds from Madagascar, including *Rahona ostromi*, which phylogenetic analysis places with *Archaeopteryx* and it therefore represents the most primitive bird ever examined histologically. We are really excited about this study and hopefully we will soon be able to publish our findings. I am also involved in a project with Zofia Kielan-Jaworowska and Jorn Hurum, of the University of

Oslo, and Susan Evans, University College, England, looking at the bone microstructure of early Eutherians and Multituberculates. This is yet another exciting project the results of which should provide insight into the growth strategies of these early mammals.

Regarding my students: **Jennifer Botha**, has successfully upgraded to a Ph.D. She will continue working on the bone microstructure of cynodonts, as well as add a new dimension to the study by looking at palaeoecological aspects using oxygen and carbon isotopes. **Tamara Franz**, will shortly be joining our research team as a Ph.D. student and will be looking at palaeopathology in the Pliocene fossil record. In addition, **Sanghamitra Ray** of the Statistical Institute of Calcutta will soon be coming out to work with me as a postdoctoral fellow.

Earlier this year I had the wonderful opportunity of attending the *Ostrom Symposium* at Yale University. This trip only materialized because the Tokyo Natural History Museum flew me out to the USA to be interviewed at the Peabody Museum. I was particularly pleased that the interview coincided with the symposium and the "Feathered dinosaurs of China" exhibit at the Peabody. The specimens of *Sinosauropteryx*, *Caudipteryx* and *Confusiornis* were even more stunning than I ever imagined. My next exciting trip is to Argentina for the VII Mesozoic Terrestrial Ecosystem Meeting where I've been invited as a plenary speaker. I will also participate in the fieldtrip to the Jurassic and Cretaceous beds of Neuquen. No doubt this will be a really great trip. Hopefully I will be able to share my experiences with you in the next PalNews.

Research Publications (1997-1998)

Chiappe, L.M., Coria, R. A. Dingus, L. Jackson, F. Chinsamy, A., Fox, M. 1998. Sauropod dinosaur embryos from the Late Cretaceous of Patagonia. *Nature* 396:258-261.

Constantine, A., Chinsamy, A., Vickers-Rich, P., Rich, T. Gregory, R. T.

and Johnson, K. 1998. Permafrost and polar dinosaurs. *South African Journal of Science* 94:1-5.

Chinsamy, A., Rich, T. and Vickers-Rich, P. 1998. Polar dinosaur bone histology. *Journal of Vertebrate Paleontology* 18(2):385-390.

Chinsamy, A., Martin, L. D. and P. Dodson. 1998. Bone microstructure of the diving *Hesperornis* and the volant *Ichthyornis* from the Niobrara Chalk of western Kansas. *Cretaceous Research* 19:225-235.

Chinsamy, A. and Barrett, P. 1997. Sex and old bones. *Journal of Vertebrate Paleontology* 17(2):450.

Chinsamy, A., February, E., Harley, E., Rich, T. and Vickers-Rich, P. 1997. Wood within a polar dinosaur bone. *South African Journal of Science* 93:48.



ARTHUR CRUICKSHANK, LEICESTER

The past year seems to have been one conference abstract deadline after another! So 1999 is feeling like an anti-climax - just. The first conference was *Gondwana 10* in Cape Town, just 28 years after I was a member of the organising committee for the Second IUGS Symposium. However this time I made sure that I could go on the Trans-Karoo Excursion, as in 1970 things were too busy to take that amount of time off. It was a marvellous experience to see how much has happened since the days of Paddy Ryan and Tom Stratten, who undertook the pioneering basin studies on the Ecca and the Dwyka. They were followed by Brian Turner in what was a ground-breaking study of the Molteno, and now of course by Bruce Rubidge and John Hancox, in the Lower and Upper Beaufort, to mention just those with whom I have been directly associated.

I gave two presentations to *Gondwana 10* - one on the Biostratigraphy of the Tanzanian Permian ⁽¹⁾ with Sue Gay, a student I co-supervised too many years ago for both of us, and the other was a joint paper with Ewan Fordyce of Otago University, on Gondwana plesiosaurs ⁽²⁾. The definitive versions of both are currently *in press*.

The second conference was the 46th SVPCA (UK), in Bournemouth, where I talked on "*Heterochrony in the evolution of the Plesiosauria*", This topic is fated to run a little, and will need the jargon input of knowledgeable people such as John Long and Ken McNamara in Perth, WA. Basically Heterochrony (er - paedomorphosis) can explain the differentiation of Pliosauroidea and Plesiosauroidea quite well, but we will have to see how it all develops.

Bournemouth only just got in by a short head in advance of Windhoek and the 10th PALSOC meeting, which was one of the most relaxed and friendly conferences I have attended. It was great being back in Southern Africa twice in one year.

The current year sees the 47th SVPCA in Edinburgh, to help celebrate the new National Museum of Scotland, but I do not yet know what I will be talking about if anything, but as there is a bi-centenary of Mary Anning's birth to celebrate, it may have something to do with the Early Jurassic marine reptile proliferation in Northwest Europe. Later in September, in Spain, there is a symposium on *Dinosaur Eggs and Embryos*, where I will present a joint paper with Ken Joysey and Terry Manning on *in ovo* tooth replacement in segnosaur dinosaurs. Three cheers for airline deregulation in the EC!

An interesting project looms in conjunction with Neil Clark of the Hunterian Museum in Glasgow on a recently discovered dicynodont from the Hopeman Sandstone (Late Permian) of Morayshire⁽³⁾. This is much the same age as the better-known Cutties Hillock Sandstone which has produced quite a diverse fauna, but as far as I know, this is the first from the Hopeman. Preservation is by 3-D space in the matrix, so complicated modern techniques are being called into play. All I can say is watch this space!

Maybe the year 2000 will see me back in Johannesburg to polish up the paper I presented in Windhoek and also write a discussion on the origins and relationships of the dicynodonts. This latter is a hang-over from the PhD and a poorly understood idea that I could not articulate at the time. Some of us work very slowly!

References

1. Gay, S.A. and Cruickshank, A.R.I. *in press*. The biostratigraphy of the Late Permian tetrapod faunas from the Ruhuhu Valley, Tanzania. *Journal of African Earth Sciences*.
2. Cruickshank, A.R.I. and Fordyce, R.E. *in press*. A new genus of cryptoclidid plesiosaur from the Cretaceous of New Zealand. *Palaeontology*.

3. Hopkins, C. 1999. Surprise long held in chip off the old block. *Earth Heritage* 11, 18.

Also the result of CAVEPS 97

4. Cruickshank, A.R.I., Long, J. A. and Fordyce, R.E. *in press*. Recent research into Australasian sauropterygian palaeontology. *Records of the Western Australian Museum*. Supplement.

IRAJA DAMIANI PINTO, BRAZIL

Last May the "*I Simposio Argentino del Paleozoico Superior*" was held on the new Campus - CRILAR- in Anillaco, La Rioja, Argentina. The purpose of it had intended to establish the exact stratigraphical and chronological extension of some Argentinean Paleozoic Formations. The meeting joined the majority of the Argentinean stratigraphers, palinologists and paleobotanics. I, with a colleague, presented a paper on a new *Blatta* from Genoa Formation, Betancourt, Argentina. This new species belongs to the genus *Anthracoblattina* and points to an Upper Carboniferous age, as do some other insects. These results provided a good discussion because the age of this layer is Upper Permian according to some paleobotanists. The insects and the arachnids in some Argentinean Formations point out to a Carboniferous age and the Paleobotanists insist on an Upper Permian age. The time will tell who is right. From the 1st to 7th of August the *XVI Brazilian Paleontological Congress* will be held in Crato, Ceara (North of Brazil). That is the richest fossiliferous area of Brazil. Any information about it could be obtained through paleo99@urca.br. From 6th to 17th August of the next year (2000), the *31st International Geological Congress* it will be held in Rio de Janeiro. Any information about it could be get through 31igc@31igc.org. Best regards from all of us.

Iraja



"So, Professor Sadowsky, you're saying that your fellow researcher, Professor Lazzell, knowing full well that baboons consider eye contact to be threatening, handed you this hat on that fateful day you emerged from your Serengeti campsite."

THE NATURAL HISTORY MUSEUM, PRETORIA

I am working on the last chapter of my PhD comparing the postcrania of *Terocephalia*, *Cynodonts* and *Gorgonopsia*. The amalgamation of the northern museums into the Northern Flagship Institution went well. From now on you will hear us being called the **Natural History Museum, Transvaal Museum**. We all had to make changes and adapt to new systems, but basically we are still sailing. The Palaeontology Department is humming with visitors from abroad and local. This include Canada, U.S.A, UK and France. Daryll de Ruiter is doing a massive project on Swartkrans and is discovering a lot of interesting fossils in the fossil fauna store. He is now officially part of the furniture after one month. The CAT scan library is being expanded by Francis, which now also include the hominid postcrania requested by

visitors/researchers. The wonderful therapsid collection has been moved to higher and dryer ground and is now systematically organised. This project was made possible with the help of Stephany Potze, a very keen assistant to me.

Heidi Fourie

THE COUNCIL FOR GEOSCIENCE, PRETORIA

The first few months of this year were pretty hectic at the Council as we were subjected to major internal reorganization. Although we were saved the hassle of actually moving offices, the Palaeontology Section moved divisions and we now no longer form part of the Mapping Division. We have instead, been placed in a new division called Collections Management, together with the Geological Museum and all the collections housed at the Council. Even without these winds of change blowing through our corridors, the first half of this year would not have been an idle one at the Council.

Patrick Bender is a very busy man nowadays. At this very moment he is entombed in his office, putting the finishing touches on his PhD thesis.

Barry Millstead continues; both in a metaphysical sense and as a palynologist. For this his mother, if no one else, is very happy. The view from his office window continues to enthrall, especially now that spring is visiting the botanical gardens and he often imagines himself lying on a warm beach studying wave induced movement of heavy mineral deposits.

In the odd, idle moment his mind has wandered to thoughts of palynology and this has generally been a productive exercise. Recent accomplishments include a study of the age and stratigraphic relationships of the Whitehill Formation, the results of which are contained in an open file report of the Council for Geoscience. The manuscript of his new, interim palynostratigraphy which is applicable to

the Permian, continentally deposited sediments of southern Africa has also been completed (also available on open file report) and will soon be submitted for publication. An interesting piece of research recently undertaken was on a sequence of samples from the previously undated Amelang Formation of western Dronning Maud Land. The results were presented (co-authored with Dr Phil Lindsay and others) at the *8th International Symposium on Antarctic Earth Science* in New Zealand earlier this year. Another milestone, and one that shows that no amount of bureaucracy is too large to be beaten, was the publication of a comprehensive taxonomic paper on palynofloras from the New Vaal Colliery (*Council for Geoscience Bulletin* 124).

Barry is currently well underway with a palynological investigation of the southern portion of the Molteno Formation. To date a number of very beautiful spores and pollens have been liberated from rocks and are proving most interesting. A number of what may well be stratigraphically significant taxa appear to be present in the assemblages. Barry awaits the onset of divine insight on these matters as he has never worked in the Triassic before.

Hymne Laubscher spent a lot of time sorting out the bugs on the electronic collection database, but fortunately the worst of that is now over. Not that it means that the pressure is letting up! She is another person that is currently busy finishing her thesis. In this case it is her masters on the vertebrate assemblage from the Pleistocene dunes of Basaansklip. It meant working on some old hyena dens which yielded beautiful fossils.

Johann Neveling reports as follows: "The first half of this year was a good one for fieldwork. First up was a week-long trip accompanying Bruce Rubidge and his team on one of their annual fieldtrips to the Ecca-Beaufort contact (this time near Canarvon). It was very enjoyable and a great learning experience. Very flat country that, though with little exposure."



"My God, Carlson! After years of searching, this is an emotional moment for me! ... Voila! I give you the Secret Elephant Breeding Grounds!"

"During March and May I was able to go on two fossil-collecting trips with a team of collectors (consisting of myself, Frans Tshabalala, Japie Sejake and Daniël Nkwini) for his own work on the *Lystrosaurus-Cynognathus* contact. John Hancox accompanied us for a few days in March and we made use of the opportunity to go and have a look at the coastal exposures of the Tarkastad Subgroup. Very few exposures, no fossils, but at least there is some very interesting geology in that area. Fieldwork at Tarkastad focused on the hills surrounding the town, in particular Mary to the east and Elandskop to the west. Fossils were not all that common in the contact area (that is with the exception of one or two *Procolophon* palaeo-battlefields), but we collected some nice specimens which will add a lot of value to a very interesting stratigraphic story."

"We found some good *Cynognathus* Zone fossils however, at the very end of the May-fieldtrip. It was a classic case of Murphy's first law of palaeontology (the best fossils are found at the end of any fieldtrip when you do not have enough time to excavate them). On the afternoon of the very last day of the fieldtrip we did some collecting on the farm Eensaam north of Tarkastad. As it is situated slap-bang in the middle of the *Cynognathus* Zone, I left it until the very last moment before visiting this farm. It proved to be very rich in fossils and we most probably saw more bone during that afternoon than in the four weeks preceding it. The cherry on top though, was two fossils that Frans found late in the afternoon as we were about to pack up and go home. These two fossils consist of the complete skeleton of a small carnivore and the partial skull and complete skeleton of a large Theriodont, both trapped in a thin splay sandstone. Positive identification is not possible at the moment, but I will keep you posted as preparation progresses. Other than accompanying John Hancox and Ross Damiani (from the BPI) on a very short fieldtrip in July, I spent the rest of the winter hibernating in Pretoria..."

THE INDABA PROJECT - a meeting in Vienna

INDABA is an acronym which has been given for the development of an international database (IN for international, DA for data and BA for base), incorporating images and data obtained from CT scans of hominid fossils. The project has been supported by the Department of Arts, Culture, Science and Technology, through a palaeoanthropological heritage project; it is also supported by the Institute of Human Biology (Vienna), associated with Prof Horst Seidler and his team including Dr Gerhard Weber and Dr Wolfgang Recheis. The INDABA project was initiated several years ago, and has facilitated the CT scanning of several fossils from South Africa and East Africa.

A meeting in Vienna allowed the opportunity for palaeoanthropologists from many countries to meet, not only to discuss the results of CT scans of hominid fossils, but also to attend the *Phillip Tobias Lectures*, a series

of lectures that focussed on the anatomy and development of the brain.

I welcomed the opportunity to meet Professor Magori and Dr Saanane from Tanzania, and representatives from Ethiopia. I welcomed the opportunity to talk to colleagues about the development of the INDABA database. It is an exciting time in many respects, and the "indaba" (meeting together, talking together, working together, on an international level) is welcomed at a time when President Thabo Mbeki is calling for an "African Renaissance". President Mbeki made reference to the wealth of fossils "from South Africa to Ethiopia" in his inaugural address.

We are pleased to be contributing to an effort focussed on a greater understanding of our hominid ancestry, and are working in various ways to promote public awareness of our heritage which is part of world heritage.

I am grateful to the Department of Arts, Culture, Science and Technology for their support for these initiatives.

Francis Thackeray [Palaeontology Department, Transvaal Museum, Northern Flagship Institute]



Rocking the anthropological world, a second "Lucy" is discovered in southern Uganda.

ANATOMY, MOZART AND MUSIC

Francis Thackeray

Wolfgang Amadeus Mozart, born in Salzburg in 1756, is regarded as one of the greatest musicians the world has ever known. Despite the success of many concerts performed to enthusiastic audiences in Vienna and in other European capitals, he struggled financially, especially towards the end of his life (Robbins Landon, 1999; Haldane, 1960). His attempts to secure well-paid positions appear to have been thwarted by rivals, notably Antonio Salieri who enjoyed a comfortable appointment as *Kapellmeister* in the Hapsburg Court, where Mozart received a relatively small salary as a chamber musician for Emperor Frans Joseph II.

Mozart wrote his last piece, a requiem, under the impression that he had been poisoned. Rumours implicated Salieri in the circumstances of Mozart's death, and suspicions of poisoning were widespread. However his death in 1791, when he was only 35 years old, has been attributed to causes other than poisoning (Davies, 1984; Neumeyer, 1987). The suggested causes of death include cerebral haemorrhage.

A funeral service was performed at St Stephen's Cathedral in Vienna, after which he was buried in a pauper's grave in St Marx cemetery. Although his grave was unmarked, gravediggers allegedly retained his skull when the cemetery was replanned a few years after his death. Some years later the cranium came into the possession of the family of an anatomist, Joseph Hyrtle. It has been kept at the Mozarteum in Salzburg since 1901, and has been the subject of a number of anatomical analyses (Puech *et al*, 1989, 487-490; Puech *et al* 1989, 327-330; Puech *et al*, 1990; Tichy and Puech, 1987), under the assumption that contextual information recorded by Hyrtle on the cranium correctly identifies it as that of Mozart.

In this article I look at anatomical evidence presented by Puech and his colleagues, in the context of certain historical and musicological documents (Robbins Landon, 1999), and in the context of ideas expressed

by one of Mozart's contemporaries, Franz Joseph Gall, an anatomist who developed controversial ideas about the human brain and its functions.

A haematoma associated with a skull fracture

Anatomical studies of a skull, recorded by Hyrtle to be the cranium of Mozart, indicate an injury on the left side of the head, some time prior to death (Puech *et al.*, 1989, 327-330). The exact date and cause of the injury are not known. A fracture 100 mm in length has been detected on the outer surfaces of temporal and parietal bones. The impact was such that it led to an extensive extradural haematoma with subsequent reshaping of inner cranial bone and apparent loss of the left Sylvian crest. This bony ridge normally corresponds to the Sylvian fissure in the brain.

It is known that Mozart complained of headaches within the last two years of his life, during which he had at times wrapped his head in bandages. A haematoma associated with a skull fracture may have been a factor contributing not only to the decline in his health, but also ultimately to his death on December 5, 1791.

In the late evening of December 4 or early morning of December 5, a doctor instructed that a cloth impregnated with vinegar and water be applied to Mozart's "temples and forehead" (Robbins Landon 1999, 226). Sophie Haibel (Mozart's sister-in-law) tried to prevent this, but the doctor "persisted in his orders". Mozart "shuddered" in response to the application of this acidic solution, which would have been traumatic if a skull fracture and scalp injury had not fully healed. Mozart lapsed into a coma after mouthing the drum beat of one of the movements of his *Requiem*.

A protege of Mozart, Ludwig Gall, was deeply disturbed to learn of the death of his "Master" (Robbins Landon 1999, 168). He came to the house on the morning of Mozart's death, and reported seeing the body "lying in a coffin, in a black suit with a cowl down over his forehead, hiding his blond hair". If Mozart had suffered a head fracture, the injury would not have been visible to those such as Ludwig Gall who came to

pay last respects to the composer.

Franz Gall, "Phrenology" and Mozart

A contemporary of Mozart was an anatomist named Franz Joseph Gall, who developed a controversial field called "phrenology". He studied for a medical degree in Vienna from 1781 until 1785. He claimed that he could associate certain areas of the human brain with particular functions. Gall claimed that the "music centre" of the human brain lay "over the fissure of Sylvius". However, he was ridiculed for making claims based on "bumps" felt on the external surfaces of skulls. He had even gone so far as to obtain casts of the surfaces of the heads of Mozart, Beethoven and other prominent musicians (Hollander, 1901).

It is understandable that Franz Joseph Gall's ideas on phrenology were met with scepticism. Even Napoleon expressed his contempt by saying "I should be glad to know what Gall would say of me if he felt my head...Nature does not reveal herself by external shapes" (quote cited by Hollander, 1901). Stiff, a medical doctor attending Emperor Franz Joseph II and Maria Theresa, was also contemptuous of Gall who had once been offered an appointment in the Hapsburg court. Stiff evidently "contrived to render Gall's stay in Vienna impossible" and recommended that the emperor and clergy "prohibit his lectures as being of *dangerous tendency*" (Hollander, 1901, pp 372, 444).

Despite the controversy surrounding Gall's "phrenology", the identification of possible association areas in the human brain attracted interest. Cuvier, a French palaeontologist, offered some support for his basic ideas. Broca and Wernicke were later given credit for identifying speech areas, based on their studies of patients who had suffered not only speech loss but also brain damage, the nature of which was subsequently identified in post-mortem analyses. "Broca's area" happened to correspond closely to the region which Gall had previously identified as a speech area (Hollander, 1901).

Left Sylvian crest absent

The skull in Hyrtle's possession, reported as the cranium of Mozart, was sectioned (apparently by Hyrtle himself more than a century ago) through the auditory meatus along a line parallel to the Frankfurt horizontal plane, thereby exposing features on the inner cranial wall. Anyone who might have been particularly interested in a Sylvian crest would have found that such a feature did not exist on the left side of the cranium. Its absence is apparently due to remodelling of inner cranial bone subsequent to an injury that had led to an extensive extradural haematoma some time prior to death (Puech et al, 1989:327-330). The haematoma happened to have affected part of the brain that Gall had identified as a "music centre", notably a region "over the fissure of Sylvius".

Franz Joseph Gall's claims regarding a "music area" were not based on secure evidence. It is possible that many regions of the human brain in both left and right hemispheres are important in co-ordinating the composition and performance of music, and if there is any principal "music area" in the human brain it may exist in the right hemisphere (Luria, 1978). If a head injury had affected Mozart in the last year of his life, it certainly did not prevent him from composing music, notably *La Clemenza di Tito* (performed in Prague in September 1791), the *Magic Flute* (well received in October in Vienna), and movements for the *Requiem* in November of the same year, under duress.

Mozart and Salieri

As reflected in the screenplay of Shaffer's *Amadeus*, Antonio Salieri was intensely jealous of Mozart's abilities. He appears to have been especially protective of his own well-paid position in the court of Emperor Frans Joseph II and his successor, Emperor Leopold II.

In 1790 Mozart pawned (and lost) his silverware as one desperate attempt to raise funds to travel to Frankfurt, with the objective of trying to make an impression on Leopold II at the time of his coronation. Mozart failed. His concert happened to coincide with other attractions, and his performance was attended by very few people, one of whom expressed

anger at the poor attendance. By contrast, Salieri was comfortably situated with the royal entourage, and almost certainly contributed to arrangements that excluded Mozart. Writing to his wife Constanze, Mozart said "*Some obstacle has arisen on every day during my stay here*". He went on to say "If people could see into my heart, I should almost be ashamed. To me everything is cold. Cold as ice" (cited by Haldane, 1960, 119).

It is clear that Leopold II developed a low opinion of Salieri some time after 1790. The Emperor said scathing things about Mozart's rival to Lorenzo da Ponte :

Never mind Salieri. I know all about him. I know all his intrigues... Salieri is an insufferable egoist. He wants success in my theatre only for his own operas...He is not only your enemy. He is an enemy of all composers...and above all, my enemy, because he knows that I know him" (cited by Robbins Landon, 1999, 90).

Shortly after Mozart died in 1791, an anonymous musician said that his death was a sad event, but had Mozart lived, how could other musicians have survived? This "epitaph" would seem to be consistent with Salieri's attitude towards Mozart. Salieri enjoyed financial security from Emperor Frans Joseph II and (at least for a time) found favour from Emperor Leopold II.

Salieri recognised Mozart's abilities, and may have perceived Mozart as a potential threat. There is evidence suggesting that Salieri felt "uneasy" over his position (Angermuller 1974, II: 211; Robbins Landon 1999, 90).

According to one report, Salieri had admitted to being responsible for Mozart's death, and had made an attempt on his own life when he made this admission. The veracity of this report has been questioned (see Robbins Landon, 1999), but Salieri appears to have been disturbed by the suspicions held against him in the context of Mozart's death.



Mozart suffered financially and emotionally from his visit to Frankfurt in 1790. He did not raise the money which he had expected from his performances, and he did not have the opportunity to find favour with the new emperor, Leopold II. Mozart returned to Vienna in debt, complaining of headaches. His headaches persisted until the time of his death in December 1791. Ironically, just a few days before his death in 1791, he was aware of an offer of an appointment as *Kappelmeister* at St Stephen's cathedral, with the opportunity for financial security. He had recognised that he was dying just when he had the potential opportunity to compose what he wished, rather than writing commissioned works. The *Requiem* was his last (unfinished) work, commissioned by an aristocrat, Herr Count von Walsegg, whose identity was not made known to the composer under circumstances which traumatized Mozart on his deathbed. Count von Walsegg had intended to pass it off as his own work, in memory of his wife who had died at the age of 21. The death of Mozart, when the *Requiem* was unfinished, presented difficulties. The

musical score was completed by more than one musician, including Franz Sussmayer who had been employed by Salieri for certain services only a few months before Mozart's death. The Count wrote his own copy of the score but reached a settlement with Mozart's widow. Sussmayer forged Mozart's signature on the original score of the *Requiem* which was eventually published under Mozart's name.

Conclusions

In Frankfurt in 1790, Mozart had been thwarted in his attempts to make an impression on Leopold II. He had written to his wife Constanze to say that "Some obstacle has arisen on every day during my stay here", when Salieri was helping to make arrangements for musical events associated with the coronation of Leopold II. Salieri was concerned about the security of his own position. An anonymous musician's "epitaph" for Mozart incorporated the sentiment that musicians would find it difficult to survive if Mozart had continued to live beyond 1791. It is not certain that this "epitaph" was expressed by Salieri, but Leopold II had said "I know all about [Salieri]. I know all his intrigues....*He is an enemy of all composers* (cited by Robbins Landon 1999, 90).

Mozart appears to have died from the effects of several factors, not necessarily poisoning as he himself had suspected. If the skull allegedly exhumed by gravediggers and passed on to Hyrtle is indeed that of Mozart, there seems to be anatomical evidence to suggest that a fracture on temporoparietal bone, 100 mm in length, led over a period of time to a haematoma which in turn may have contributed to his decline in health, and indirectly if not directly to his death. How was that injury caused? Was it inflicted accidentally, perhaps the result of a fall as suggested by Puech *et al* (1989: 329), or was there something possibly malicious behind it, something about which Mozart did not write (just as he did not want to publicise his poverty)? The latter question leaves open possibilities that may relate to Gall's controversial phrenology, in the context of rivalry and jealousy among one or more contemporary musicians.

Forensic science has led to the recognition that the skull attributed to

Mozart shows signs of a haematoma associated with a fracture, and the haematoma appears to have affected part of the brain that Gall had identified as a "music centre", notably a region "over the fissure of Sylvius". Gall was working on phrenology when Mozart was struggling to find a secure position as a composer. Gall had delivered public lectures until he was apparently prevented from doing so in Vienna, on account of the perception that his ideas were "dangerous" (Hollander, 1901). In the case of the cranium studied by Hyrtle and Pusch *et al* (1989, 1990), it may be entirely coincidental that the head injury affected an area that Gall had associated with a "music area" of the human brain. However, considering the intrigue and jealousy prevalent at the time of Mozart's death, is it possible that one or more persons with at least some knowledge of Gall's ideas had attempted to use Gall's claims with malicious intent?

One important issue concerns the question whether the cranium analysed by Hyrtle, Pusch and others really is that of Mozart. Pusch *et al* (1989) have compared features of the skull and portraits of Mozart to support the identification of the cranium in the Mozarteum. It is said to be that of a male, with an age corresponding to that of Mozart at the time of his death (only 35 years). Further, Pusch *et al* (1989) suggest that in his early stages of development, as a foetus and as a young child, Mozart was affected by early closure of the metopic suture, with subsequent effects on the development of the glabella. This occurs rarely in infancy in modern human populations (less than 0.1%), and does not necessarily have adverse impacts on brain development although it can affect cranial shape. Pusch *et al* (1989) claim that portraits of Mozart correspond to features observed in the cranium which Hyrtle labelled as that of Mozart with contextual information. Headaches reported by Mozart within the last two years of Mozart's life are consistent with the observation of a cranial fracture on the cranium that was studied by Hyrtle in the last century, and in more detail by Pusch *et al* (1989).

The cranium attributed to that of Mozart is "ultrabrachycephalic", having a relatively large cranial capacity of 1585 cc, and relatively small orbit

dimensions (Puech *et al* 1989). Mozart was a small man (probably less than 1.5 metres tall). In the context of relationships between brain size relative to body size and indicators of body size (Pilbeam and Gould, 1974; Tobias, 1971; Aiello and Wood, 1994; Thackeray, 1977), it may be noted that the cranium studied by Puech *et al* (1989) is unusually large relative to body size, but it cannot be inferred that Mozart's extraordinary musical abilities were necessarily associated with an unusual ultrabrachycephalic cranium which was very large in relation to body size. Nor can we expect that his musical abilities were necessarily associated with the development of any particular area of the brain which expanded in infancy in a way to compensate for changes associated with the rare condition of early metopic suture closure. However, it is certain that the development and expansion of Mozart's brain during infancy coincided with his exposure to music by his father Leopold, himself an accomplished musician who had an ambition to develop Mozart's potential and to show him off in the courts and concert halls of Europe. Less certain is the exact cause of death, the extent to which a haematoma associated with a skull fracture may have contributed to his death (if at all), and whether such a fracture was the result of an injury perpetrated in a deliberate malicious attempt to affect Mozart's career on the (mistaken) assumption that Franz Joseph Gall had identified a "music area" of the human brain.

References

- Aiello, L.C. and Wood, B.A. 1994. Cranial variables as predictors of hominine bodymass. *American journal of Physical Anthropology* 95: 409-426.
- Angermuller, R. *Antonio Salieri*. Munich
- Davies, P.J. 1984. Mozart's illnesses and death. *Musical Times* 125.
- Haldane, C. 1960. *Mozart*. Oxford University Press.

Hollander, B. 1901. *The mental functions of the brain: An investigation into their localisation and their manifestation in health and disease.* Richards: London.

Landon, H.C. Robbins. 1999. *Mozart's last year.* Thames and Hudson.

Luria, A.R. 1978. *The working brain: An introduction to neuropsychology.* Penguin: New York.

Neumayer, A. 1987. *Musik und Medizin*

Pilbeam, D. and Gould, S.J. 1974. Size and scaling in human evolution. *Science* 186: 892-901.

Puech, B., Puech, P.-F., Tichy, G., Dhellemmes, P. and Cianfarani, F. 1989. Craniofacial dysmorphism in Mozart's skull. *Journal of Forensic Sciences* 34,2: 487-490.

Puech, B., Puech, P.-F., Dhellemmes, P., Pellerin, Ph., Lepoutre, Fr. and

Tichy, G. 1989. Did Mozart have a chronic extradural haematoma? *Injury* 20: 327-330.

Puech, B., Puech, P.-F., Dhellemmes, P., Pellerin, Ph., Lepoutre, Fr. and

Tichy, G. 1990. W.A. Mozart: Craniofacial anomalies and pathology. *Anthropologie* 28, 1: 67-78. Presented at the Second international Congress of Human Palaeontology, Turin, Italy.

Thackeray, J.F. 1977. Possible relationships between cranial capacity and body size estimates in modern man and in fossil hominidae. Yale, unpublished MS.

Tichy, G and Puech, P.-F. 1987. Identification of a "passing guest", Wolfgang Amadeus Mozart. *Journal of the Canadian Society of*

Forensic Science 20,3: 176-177.

Tobias, P.V. 1971. *The brain in hominid evolution*. Columbia University Press, New York.



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The former **Foundation for Research Development (FRD)** concluded an agreement with the **Alexander von Humboldt Foundation** for the reciprocal exchange of two internationally renowned researchers between South African and Germany. In terms of this agreement two research awards are made available annually to two internationally renowned German researchers in the fields of sciences (natural and social), humanities, mathematics, medicine, engineering and agriculture to spend a period of between four and twelve months in South Africa, to participate in a cooperative research programme of his/her own choice.

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Nominations must be submitted via the executive head (or his or her designate) of the institution to which the nominator is attached. Nominations which are not supported by the executive head should also be forwarded to the NRF with a note to this effect. Submissions must be sent to the **NRF, PO Box 2600, Pretoria, 0001** (Attention Mrs R Robertson) and should be received before the 31st of October if it is to be considered for the year 2000.

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Enquiries may be directed to:

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