

Australasian Primatology

Editor's Report

The Conference held in Melbourne in December was a very successful one with a very interesting and diverse programme of papers and a great deal of simulating and thought-provoking discussion on a wide range of primate topics. The Annual General Meeting was one of the most interesting and dynamic ones that the Society has ever had, with many issues raised and plans put in place . Congratulations to Amanda Embury, Debbie Williams and the rest of the excellent Melbourne Zoo support team.

There were two interesting outcomes from the conference. The first is that for the first time in over fourteen years the membership fees are to increase. Due to the increasing cost of producing the journal and general running of the Society fees will increase from July 1, 2003. The new fee structure will be \$30 for general membership, \$20 for students/unemployed, pensioner, \$40 for family and \$50 for corporate institutions. If you have not been contacted already, please let me know if you would be willing to receive the journal in electronic form as this greatly reduces the running costs for the Society

The second is that the APS is assisting in the co-ordination of funding requests to the Great Ape Survival Project or GrASP. A selection of projects for each of the apes will be presented to the Australian government for consideration. For further information on the project, visit <http://www.unep.org/grasp/> and, through the updated Related Sites page on our website, visit some of the organisations which will be supported by our requests

SOCIETY OFFICERS

PRESIDENT Mr Graeme Crook Adelaide SA
 VICE PRESIDENT Mr Graeme Strachan Wellington NZ
 SECRETARY Ms Penny Harper Adelaide SA
 TREASURER Ms Christine Baker Adelaide SA
 EDITOR Mr Graeme Crook
 Executive Council
 Professor Colin Groves -ANU, ACT
 Mr Leif Cocks -Perth Zoo, WA
 Regional Representatives
 ACT Professor Colin Groves - ANU
 NSW Ms Louise Grossfeldt - Taronga Park Zoo
 QLD Ms Jo Davis Univ of Qld
 VIC Ms Debbie Williams - CSL
 SA Ms Penny Harper -
 WA Dr Rosemary Markham - Perth Zoo
 NZ Mr Alexis Manirakiza- Wellington Zoo
 TAS Mr Malcolm Marshall - Launceston City Council
 NT Ms Marianne StClair

The Australian Primate Society is a non-profit scientific society. Membership is available to individuals and institutions working in any area of primate research, or showing an interest in primatology. The fee is Aust \$25/year regular membership, institutional and overseas membership; AS 15 student; AS\$35 joint or family membership. This includes subscription to *Australasian Primatology*. New Zealand members can now renew their membership directly to Alexis Manirakiza at Wellington Zoo (SNZ 30)

Enquiries to: Mr G A Crook PO Box 500 One Tree Hill SA 5114
The Australasian Primate Society and its officials accept no responsibility for opinions expressed and statements made herein by the authors of papers.

Page

XXI st Annual Conference Abstracts	2
XXIst Annual General Meeting Minutes	14
Book Notice-- Gorilla Biology	18
Biodiversity Grant	21
Latest Ape updates	23

XXIst Annual Conference of the Australasian Primate Society

Caring for our Cousins

Focusing on primate conservation and Husbandry of captive primates

6th December - 8th December 2002

VENUE: Education Resource Centre, Melbourne Zoo, Elliott Avenue, Parkville, Melbourne, Victoria

Program

Friday 6th December – focus on Asia: Orang-utans & EPRC

- 7.30pm Endangered Primate Rescue Center, Cuc Phuong, Vietnam, a talk by Roland Wirth.
- 8.15pm Responsible Tourism using Orang-utans as an example, presented by Jane Crouch from Intrepid Travel
- 8.30pm The work of the Australian Orang-utan Program presented by Leif Cocks from the Australian Orang-utan Program and Perth Zoo
- 9.00pm Progress report on the Sumatran Orang-utan Conservation Program, presented by Leif Cocks on behalf of Ian Singleton, Sumatran Orang-utan Conservation Program

Saturday 7th December

9.00am Registrations

Session 1: Chair – Amanda Embury

- 9.15am Opening and Welcome: Peter Courtney, Curator of Primates, Melbourne Zoo
- 9.30am Past our Prime, ageing human and non human primates Cobie Brinkman
- 10.00am Primate Re-introductions – fact or fiction, Graeme Crook
- 10.20am Nonhuman primates – a review of diseases of quarantine concern, Margaret Leggoe, Biosecurity Australia
- 10.40am Pan African Sanctuary Alliance – Alexis Manirakiza, Wellington Zoo
- 11.00am The Bushmeat Trade – brief update on initiatives supported by Melbourne Zoo, Heidi Wenk, Melbourne Zoo/Box Hill TAFE
- 11.40am Site Tour of Melbourne Zoo – primate exhibits

Session 2: Chair – Colin Groves

- 1.40pm Collection Management of Primates in Australian Zoos, Amanda Embury, Zoos Victoria
- 2.00pm Conditioning Gorillas at Taronga Zoo – Louise Grossfeldt
- 2.20pm Handraising an infant gorilla with dietary hypersensitivity, Damian Lewis, Melbourne Zoo
- 2.40pm The care of orphan Chimpanzees in Uganda, Penny Harper
- 3.00pm Lemurs of Madagascar, Phil Norman, Melbourne Zoo
- 3.30pm Annual General Meeting

Sunday 8th December

Session 1: Chair – Graeme Crook

- 10.00am Ape art: 40 years after Congo and “The Biology of Art, : Cobie Brinkman

- 10.20am The new Orang-utan Exhibit at Perth Zoo by Leif Cocks, Perth Zoo
- 10.50am Demonstration of Environmental Enrichment Devices, Joe Parsons, Aussie Dog Toys
- 11.40am Site Tour of new Trail of the Elephants Exhibit
- Session 2: Chair – Leif Cocks
- 1.40pm Conditioning Program for Primates at Melbourne Zoo – Fleur Butcher, Jason Barry, Kelly Hobbs – Primate Keepers, Melbourne Zoo and Dr. Katrina Gregory
- 2.40pm Poster – Moira Brennan – The structure and function of the forearm and hand of the Orang-utan
- 2.50pm Poster – Cognitive Capacities of Chimpanzees (*Pan troglodytes*): implications for enrichment, Emma Collier-Baker and Jo Davis, University of Queensland
- Session 3: Chair – Cobie Brinkman
- 3.15pm Review of methods for diagnosis of TB in non-human primates. Case report of tuberculosis in a Western Lowland Gorilla at Melbourne Zoo, Dr. Helen McCracken, Senior Veterinarian, Melbourne Zoo
- 3.40pm Update on Tarsiers, Colin Groves, Australian National University
- 4.00pm Review of Conference, outcomes

Abstracts

Past our prime: Aging in human and nonhuman primates

Cobie Brinkman

School of Psychology, The Australian National University, Canberra, Australia 0200

Studies of the biological consequences of aging are increasingly important in designing ways to help the increasing proportion of aged persons worldwide to conclude their lifespan with “healthy aging”. While good progress is being made with many “diseases of old age” that affect the body, treatments (let alone cures) for the increasing numbers of aged people with brain damage such as Parkinson’s disease, or from suffering strokes, are insufficient, or not available at all, as in Alzheimer’s disease. Nonhuman primates (NHPs), because of their evolutionary close proximity to humans, are valuable models of brain function in health and disease, (It must be stressed though that NHPs are not the only animal models – genetically engineered mouse models, and research into stem cell therapy using rodents, are but two other major avenues of research into aging.) 25% of all articles using NHPs now are studies of the central nervous system (CNS): increasingly, studying behaviour, brain activity, and therapeutic interventions, in models of Parkinson’s disease and stroke, and in aging NHPs (Brinkman, unpublished observations). Changes in the connectivity of nerve cells, in receptors, and in certain neurotransmitters, and Alzheimer type changes have been reported in aged NHPs, as well as cognitive deficits resembling those of aging humans. Of particular interest is the “Aging in Great Apes” project, a worldwide effort, collecting behavioural data in aging apes, to be followed by detailed anatomical and neurochemical postmortem studies of their brains. This, with the planned sequencing of the chimpanzee genome, will aid in our understanding of the common features of apes and humans, as well as their differences, in relation to aging, and to normal and abnormal CNS function. Already, there are tantalizing glimpses, such as differences in brain gene expression, in the FOXP2 gene (involved in language), sizes of prefrontal cortical areas, complexity of visual and auditory cortex, and the occurrence of a unique nerve cell type (cells which disappear in Alzheimer’s). An Aging Primate Data base has also been set up, and the macaque genome may

also now be sequenced. Although these developments have occurred, in the first instance, for the benefit of aging humans, they will also help to understand aging in NHPs, and allow us to make informed decisions about how to achieve “healthy aging” for them as well. The presentation will review these recent developments.

Primate Reintroduction: Fact or fiction?

Graeme Crook

One of the reasons often stated for the existence of captive animals in zoological collections is that of conservation. The main public perception of conservation is that of the reintroduction of captive bred animals back into the wild. However, what really is reintroduction? Is it merely relocation, restocking or actually reintroduction? What are the criteria necessary to satisfy before even considering reintroduction? Is it worth the effort?

An analysis of the existing rationales and processes reveals a very complicated and expensive path which should be adhered to if a proposed reintroduction is to get off the ground, never mind have any chance of success. A history of primate reintroductions will be investigated and I will look at how successful these have been (how do you gauge success anyway?), as well as possible methods of improvement. I will look into the future and how zoos can continue to contribute in a positive way to the conservation of primates around the world.

Nonhuman primates - a review of diseases of quarantine concern

Margaret Leggoe
Biosecurity Australia

This is quite a big project, and is aimed at making import conditions more specific to the primate species and disease agents of concern. My talk will cover the way we look at agents to decide whether or not they pose a quarantine risk, and the types of quarantine measures that may be employed to provide an appropriate level of protection.

Interim conditions for the importation of non-human primates do exist. I would prefer not to discuss these because it could be construed that they pre-empt the findings of the main review. They do not. They are in place to permit importations to continue pending the full review.

Primate Collections in Australian Zoos

Amanda Embury
Convener Primate Taxon Advisory Group

An overview of role of the Primate Taxon Advisory Group in collection planning and species management. The Primate Taxon Advisory Group provides a strategic approach to the ongoing management of primates in Australian and New Zealand Zoos. Various levels of management are applied to species held within collections.

The talk describes the Australasian Species Management Program in relation to primates.

The relationship between zoos within this region to other regions, and with conservation programs is also considered.

Conditioning of Gorillas

Lou Grosfeldt
Taronga Zoo

Keeper Lou Grosfeldt will talk about the conditioning program used to manage Taronga Zoo's family group of gorillas. The impact of the program on group management, including benefits to individual gorillas will be discussed.

Handraising an infant gorilla with dietary hypersensitivity

Damian Lewis
Primate Section Melbourne Zoo

Hand-rearing an infant gorilla is challenging enough in itself. The decision to remove the gorilla from its mother is one that is not made lightly. In the case of one of Melbourne Zoo's young gorillas the situation has been further compounded by dietary hypersensitivity. Keepers and veterinary staff have undergone a lengthy process trialling various options. Their perseverance has been rewarded, with the young gorilla now integrated with the family group.

Caring For Orphan Chimpanzees In Uganda.

Penny Harper

The author went to Uganda as a volunteer with the Chimpanzee Sanctuary and Wildlife Conservation Trust for three months. This Trust operates a chimpanzee sanctuary on Ngamba Island in Lake Victoria. Out on Ngamba Island there are two chimpanzee groups. An adult group of 19 and an infant group, currently 15. Newly confiscated orphans have to do a 3 month quarantine period before going out to join this infant group. This is where the volunteer carers come in. They act as "mother" to the infants, a 24 hour, commitment, with the chimp depending on you as it would their natural mothers in the wild. This This includes sharing your bed, and taking the infant wherever you go.

This presentation gives an insight to the daily happenings of a "human chimp "mother" Its joys and tribulations! It will also show the island paradise that is the new home for these orphans and the dedicated work carried out by the Ugandan staff there and the Trust.

Lemur-spotting in Madagascar

Philip Norman
Veterinary Department, Melbourne Zoo

An account of travels in Madagascar; seeing various lemur species in the wild. A slide presentation showing the various sites and species seen. Of particular note is the release site for the Black and White Ruffed Lemur. The role of tourism in supporting conservation endeavours is discussed. The talk also provides an insight into lemur conservation work undertaken in Madagascar, including community education programs supported by Ivoloina Zoo, and ways in which Australian Zoos can provide support through the Madagascar Fauna Group.

Ape art: 40 years after Congo and "The Biology of Art"

Cobie Brinkman

The Australian National University, School of Psychology, Canberra, Australia 0200

40 years ago, Desmond Morris published "The Biology of Art: A Study of the Picture-Making Behaviour of the Great Apes and its Relationship to Art" (Methuen & Co, 1962), summarising what was known of painting apes (gorillas and chimpanzees, but also *Cebus* monkeys) and describing his 'experimental' approach to ape painting. Comparing apes' works with contemporary non-representational art, and with children's drawings, Morris identified six "biological principles of picture making," and expressed the hope that working with "carefully selected teams of apes and monkeys" "a great deal more about the mystery of the process of artistic creation could be unraveled". However, Morris' hoped for Institute for the Study of the Biology of Art was never built, although apes have continued to paint (eg, at Perth Zoo); moreover, non-primates have taken up brushes - Sydney's Museum of Contemporary Art has hosted a show of paintings by Thai elephants- and monkeys, "sculpture" - *Cebus* monkeys modify clay shapes and may use tools, or paint, to mark them (Westergaard and Suomi, 1997). But are apes' artistic efforts merely evidence of Morris' first principle of Self-rewarding Activation (what might, to-day, be called "environmental enrichment"), or do any or all of his other principles also apply? Lenain (1990/1997; 1995), using the tools of the art critic and historian, concluded "a monkey painting is not a work of art". At best, only Morris' first principle applies; studies of ape painting are useful only to describe "the evolutionary gap between animal behaviour and human culture". However, many people believe that this evolutionary gap may be very small: eg, the often quoted evidence of chimpanzees and humans sharing almost 99% of DNA. As a consequence, humans have been described as the "third (species of) chimpanzee" (Diamond, 1991), and some consider ape/human differences as so minimal that apes should be given "personhood" (Cavalieri and Singer, 1993). Why, then, should they not paint like humans? An answer to this question may be found using neuro-ethological principles, comparing the brains, and the behaviours they produce, of chimpanzees and humans. If painting is, at base, a neural visuomotor transformation, there are few major differences between the visual and motor systems of the two species. However, there is, in humans, an enormous relative increase in size in the link between these two systems, the prefrontal and parietal association cortex (Deacon, 1997). It is that cortex which gives modern humans their ability for abstract and symbolic thinking and planning, and highly detailed executive functions. The likely relationship of the enlarged association cortex to the planning, execution and appreciation of art works would explain the emergence of art, and the accelerated development of culture, with the advent of modern humans (Mithen, 1996; Tomasello, 1999), support Lenain's (1990/1995) conclusions, and go against Morris (1962) idea of a comparative biology of art. In fact, a re-examination of Morris data suggests that ape art may indeed obey only the first principle and only be an exciting (and for the institution, well-paying) form of environmental enrichment.

Perth Zoo's new Orang utan Enclosure

Leif Cocks

Perth Zoo, WA

Perth Zoo has just completed Stage I of its planned orangutan enclosure renovations. This included building one new exhibit. The exhibit features above ground public viewing, flexible climbing structures and new behavioral enrichment devices. The exhibit also includes an external pole by which orangutans can exit the exhibit.

This paper describes the planning and design process, the construction and the post-

construction evaluation of the exhibit. It is hoped that zoos planning to build new orangutan exhibits will benefit from Perth Zoo's recent experience.

Environmental Enrichment Devices for Primates

Joe Parsons
Aussie Dog Toys

The work that goes into creating environmental enrichment devices suitable for primates will be described and various products demonstrated. Devices have been made for primates in a range of situations. Recently, work items have been prepared for Orang-utans in a rehabilitation centre in Borneo.

Conditioning of Primates at Melbourne Zoo

Fleur Butcher, Jason Barry, Kelly Hobbs and Katrina Gregory
Melbourne Zoo

Primate keepers from Melbourne Zoo, together with Katrina Gregory a veterinarian specialising in Animal Behavior will talk about some of the conditioning programs used at Melbourne Zoo. A short video will demonstrate some of the recent successes, including training of White-cheeked Gibbons and Ruffed Lemurs. The speakers will talk about the role of conditioning, and the benefits provided for primates and their management. A practical demonstration will follow.

Update on the Tarsiers

Colin Groves

Department of Prehistory and Anatomy, Australian National University, Canberra, ACT

A workshop on the taxonomy and biogeography of tarsiers is planned in Indonesia for February (Jemaah Islamiya permitting). Data on morphology, behaviour (especially vocalisations) and molecular genetics of tarsiers have been accumulating over the past few years, and the need for a re-consideration of their biodiversity has become pressing.

Until 15 years ago, three species were recognised in a single genus, *Tarsius*: Western or Horsfield's (*T.bancanus*), Eastern or Sulawesi (*T.spectrum*) and Philippine (*T.syrichta*). Since then, three new species have been added or extracted from synonymy, all in Sulawesi or its offshore islands: *T.pumilus*, *T.dianae* and *T.sangirensis*. Recordings of vocalisations in different regions of Sulawesi have shown astounding and unexpected geographic differentiation. Molecular clock calculations suggest that Western and Philippine tarsiers, at least, separated longer ago than had been suspected. New study of the 18th and early 19th-century literature indicates that the nomenclature is not problem-free.

I will briefly survey some of these points, and review my own work, on the morphology and morphometrics of Eastern Tarsiers.

Posters

Enrichment: Up To Scratch?

Arnold S. Chamove
Massey University Psychology, NZ.

This poster presents aspects of environmental enrichment

What is our goal?

For the behaviour of captive primates to replicate as closely as possible those of their wild counterparts

Where did we try it?

Common Marmosets and Cotton-top Tamarins living in 5 large family groups formed the subjects of this study.

How did we try it?

Various devices were tried, including novel ways of presenting food items, and encouraging foraging behaviour

Results of the study are included in the poster.

Cognitive Capacities of Chimpanzees (*Pan troglodytes*): Implications for enrichment

Emma Collier-Baker & Jo Davis
School of Psychology
University of Queensland

It is not intuitively obvious how to enrich the lives of captive primates. Of course, objects and activities that in some way mimic aspects of life in the wild are the preferred option. Captivity is necessarily restricted though, and we are limited as to how far we can replicate the stimuli and dynamics of the natural environment. However, we can provide comparable cognitive challenges. The cognitive capabilities of a species may not be as readily apparent as their physical and social skills, but knowledge about their intelligence can provide us with another valuable resource from which to draw enrichment ideas. We are investigating the cognitive capacities of our closest living relative, the chimpanzee. There is mounting evidence to suggest that great apes share a pool of cognitive abilities with 2 year-old human children. These include invisible displacement understanding, mirror self-recognition, means-ends reasoning, pretence, imitation and empathy. These abilities are posited to rest upon an underlying capacity for secondary representation (Perner, 1991), or the ability to represent reality and concurrently hold representations of things that are not available to direct perception. Through the use of stringent controls to prohibit simple rule learning, we found robust evidence for object permanence understanding in chimpanzees. Preliminary data also indicates that they recognise when they are being imitated. This evidence for sophisticated representational understanding in chimpanzees has important implications for enrichment. Problem-solving tasks and representational devices for chimpanzee enrichment are discussed.

Gamma Interferon Enzyme Immunoassays And Their Use In The Investigation Of Tuberculosis In A Western Lowland Gorilla.

Helen E. McCracken, BSc(Vet), BVSc, MVS
Senior Veterinarian, Melbourne Zoo, PO Box 74, Parkville, Victoria, 3052, Australia

Tuberculosis (TB) in non-human primates, caused by *Mycobacterium tuberculosis* or *Mycobacterium*

bacterium bovis, is a disease of great concern in zoos due to its capacity for insidious spread to other collection animals, free-ranging animals in zoo grounds, and to human contacts. The majority of TB infections are controlled by the host's immune defences and remain latent, however some such infections progress to active and contagious disease. It is very important therefore, to have a sensitive and specific diagnostic test to identify latent cases, so that further spread of disease may be prevented by either treatment or culling of these individuals.⁴ Over the past decade, gamma interferon (IFN- γ) enzyme immunoassays (EIA) have been developed for rapid *in vitro* diagnosis of TB in several species, including humans and non-human primates. This paper reviews the relative merits of these assays and other currently available TB diagnostic techniques. Details are presented of the investigation of TB in a Western Lowland Gorilla at Melbourne Zoo, Australia, demonstrating the application of these assays.

The "gold standard" for TB diagnosis is isolation of the mycobacterial organism by culture.^{1,5} This process, however, can take up to 8 wk, and in 10-20% of human TB cases the organism is not successfully isolated.¹ Furthermore, bacteria can only be cultured from cases of active disease, and the test is therefore of no value in the diagnosis of latent TB.¹

The screening test for both latent and active TB used for many years in both humans and non-human primates is the tuberculin skin test (TST). Intradermal injection of tuberculin purified protein derivative (PPD) will induce a cell-mediated immune (CMI) response in infected individuals, producing induration at the injection site, measured at 72hr.⁵ Although this test has been used widely in humans for over a century, it is subject to considerable variation and other limitations. Inconsistencies and errors in the administration of the PPD and in the reading of results may produce either false negative or false positive results. False negatives may also occur due to anergy in immunocompromised individuals with a wide range of concurrent disease conditions. False positives may result from contact with environmental mycobacteria which share common antigens with *M. tuberculosis* and *M. bovis*, or from prior vaccination with Bacille Calmette Guérin (BCG), a strain of *M. bovis* which is also antigenically similar to the pathogenic organisms.^{1,3,4} It is expected that these limitations also apply with use of the TST in non-human primates, including the effects of BCG vaccination which has historically been used occasionally in non-human primates (Andreas Knieriem, pers. comm.). Furthermore, the efficacy of this test has not been established for the vast majority of non-human primate species, and tuberculin testing practices vary widely between zoos, including differences in the PPD preparation(s) used, antigen strength and injection site.⁵ Comparative testing, involving the simultaneous administration of *M. tuberculosis* or *M. bovis* PPD and *Mycobacterium avium* PPD at two different sites, is used commonly in non-human primates to differentiate between TB and infection with environmental mycobacteria. However, interpretation of the results of such tests in humans has shown considerable variability¹, and there have been no evaluations of the reliability of the procedure in non-human primates. The TST also has the disadvantage that it must be read after 72 hr. This introduces the issue of potential non-compliance in human patients⁴, and compromises the ability to accurately evaluate the result in non-human primates because frequently the injection site is only observed and not palpated, as it is preferable in most cases to avoid restraining animals again within such a short time period.

Several alternate methods for indirect TB diagnosis have been developed. Lymphocyte transformation assays involve incubation of lymphocytes with mycobacterial antigens. In animals with mycobacterial infection, sensitised T-lymphocytes will undergo cell division in response to the antigens, and the expansion of these cell populations is measured using radiolabelling techniques. This test has been evaluated in deer and found to have 95% sensitivity and 92% specificity, however, its value in many species remains to be demonstrated.⁵ The major disadvantages of this test are that

strict protocols must be followed in the methods and timing of blood collection and laboratory submission, and it is a labour intensive and lengthy (approximately 7d) laboratory procedure (Jonathan Streeton, pers. comm.). It is therefore not very practical or cost effective as a routine screening test.

Enzyme immunoassays (EIA) that detect circulating anti-mycobacterial antibodies have been developed for several animal species. These assays appear to be useful in detecting active TB in several species, but less effective in detecting latent infection.^{3,5} In cases of active TB, there is a heavy bacterial load and concomitant high levels of circulating antibody resulting from the inability of the immune system to control the infection. However, because mycobacteria are intracellular pathogens which replicate within host macrophages, host defences are believed to be largely dependent on T-lymphocytes, with antibodies being of only minor importance.³ It is likely, therefore, that only low levels are present in cases of latent disease.

The persistence of mycobacteria within macrophages is believed to be due to their ability to switch off the normal process of phagocytosis. The surrounding lymphocytes become cognisant of these persistent bacteria and secrete cytokines, including IFN- γ , in an effort to stimulate the colonised macrophages.⁶ The CMI, measured by the TST, is dependent on the production of these cytokines by the sensitized lymphocytes at the site of the tuberculin injection, in recognition of the mycobacterial protein.^{3,6} Based on this phenomenon, Wood *et al.* developed an *in vitro* assay for measuring CMI responses. The assay involves overnight incubation of small aliquots of whole blood with tuberculin PPD antigens and mitogen (phytohaemagglutinin) to stimulate sensitised lymphocytes to produce IFN- γ . The blood is also cultured with a nil antigen. The plasma supernatant is then assayed for IFN- γ using an EIA.^{2,3,7} The nil antigen control is used to detect IFN- γ in the circulation which, if present, may mask specific responses and make interpretation difficult. The mitogen antigen is used as a positive control to demonstrate that the blood contains immunologically competent T cells capable of producing IFN- γ . Inadequate response to this control may indicate immunosuppression or blood sample deterioration, and the test would be considered invalid.³

This assay was first applied to TB diagnosis in cattle, using bovine and avian PPDs and an EIA specific for bovine IFN- γ (BOVIGAM™, CSL Animal Health, Parkville, Victoria 3052, Australia). This test has been extensively trialled and found to have 88-100% sensitivity for culture-confirmed bovine TB (compared with 72% for the skin test) and 94-100% specificity. It has been approved by the USDA, and is now used routinely in many countries for TB diagnosis in cattle, buffalo and goats. It is also known to be effective in several exotic hoofstock species.⁸ The assay was subsequently applied to the diagnosis of TB in humans, using human and avian PPDs and an EIA specific for human IFN- γ (QuantiFERON®-TB, Cellestis Ltd., St. Kilda, Victoria 3182, Australia).^{3,4} This test has been found to have 90% sensitivity and 98% specificity in the diagnosis of latent TB.⁶ It is now used as a diagnostic test in Australia and was approved by the US FDA in late 2001. Most recently, the assay has been modified for the diagnosis of TB in non-human primates, using bovine and avian PPDs and an EIA specific for primate IFN- γ (PRIMAGAM™, CSL Animal Health, Parkville, Victoria 3052, Australia).² It has been used successfully in gorillas, chimpanzees, orangutans, gibbons, macaques, baboons, mandrills, guenons, vervets, langurs, guerezas, squirrel monkeys, marmosets, tamarins, and lemurs (Stephen Jones, pers. comm.). It is currently used as a diagnostic test in Australia and, at the time of writing, has approval pending from the USDA.

IFN- γ assays have several advantages over the TST and other indirect diagnostic techniques for TB. The tests require a single patient visit; they are not influenced by tester/observer error; they can be completed in less than 24 hr; the procedure is routine and can be handled by any standard se-

rology laboratory performing EIA's; they do not involve the introduction of foreign protein into an individual and therefore may be repeated as frequently as required; they differentiate between TB and exposure to environmental mycobacteria; and they include assessment of the patient's current immune status, permitting assessment of the validity of the test response.^{4,6} The current QuantiFERON®-TB and PRIMAGAM™ tests, however, do not differentiate between IFN- γ responses generated by TB infection and BCG vaccination, hence "false positives" may still occur in BCG vaccinees.¹ Recently, specific antigens, ESAT-6 and CFP-10, have been identified which are present in the genome of *M.tuberculosis* and *M.bovis* (and three species of atypical mycobacteria rarely associated with disease), but not in BCG or the other non-tuberculosis mycobacteria. Inclusion of ESAT-6 and/or CFP-10 in IFN- γ assays in the future will permit differentiation of these responses.¹

The following case investigation demonstrates the use of IFN- γ assays in TB diagnosis. A 20 yr old female Western Lowland Gorilla at Melbourne Zoo ("Julia") was immobilised in Jan 2002 for investigation of chronic intermittent lameness. Osteoarthritis was diagnosed and routine TB tests performed, including a comparative TST and PRIMAGAM™ assay. These tests both detected a strong response to bovine PPD, indicating infection with *M.bovis* or *M.tuberculosis* (Table 1). This was a surprising result because there has been no known case of TB in any animals at the zoo in the past 30 years. Quarantine of all new arrivals to the zoo, including TB testing of all primates, pre-employment TB testing of all staff with animal contact, and regular surveillance of the TB status of individual primates have all been effective prophylactic measures against this disease entering the collection. TB is not reported in any native or feral animal species found in the zoo grounds, and bovine TB has officially been eradicated from Australia. Our gorilla group lives in a large open air display, and visitors view the animals either through glass or at a minimum distance of 10m. TB transmission from visitors, therefore, is not considered a possibility (Jonathan Stree-
ton, pers. comm.).

Julia was wild-caught as an infant in Gambia in 1982. She was subsequently housed with chimpanzees in a rehabilitation-release centre, then relocated to a European zoo in 1990. A single TST was performed on arrival there, with a negative result. She was relocated to Melbourne in Dec 1997; a comparative TST was performed while she was immobilised for placement in the shipment crate. Seventy-two hr later, there was slight induration at the bovine PPD injection site. She was immobilised 3wk later for TB investigations including repeat TST, PRIMAGAM™ assay, thoracic radiographs and specimen collection for acid fast smears and mycobacterial culture. On this occasion, the TST and PRIMAGAM™ were both negative and the other diagnostic procedures did not detect evidence of TB. She was therefore released from quarantine.

Following the positive TST in Jan 2002, Julia was immobilised again for TB investigations, including all procedures undertaken in Jan 1998, with the addition of gastric and colonic endoscopy and biopsy, and PCR on specimens collected for culture. While the PRIMAGAM™ was positive, all other tests were negative for evidence of active disease. Furthermore, Julia has no clinical signs of active disease. A prophylactic course of isoniazid and rifampicin was implemented.

IFN- γ assays proved very valuable in the investigation of this case:

There was a possibility that the TST result in Jan 1998 was a false negative, either due to errors in injection or reading techniques, or due to immunosuppression, possibly induced by the significant stress of relocation. These possibilities, however, were ruled out as the PRIMAGAM™

result was also negative, and the strong mitogen response indicated immunocompetence. It was concluded from this result that the earlier TST response was therefore likely to be a false positive, possible due to injection trauma or other trauma to the eyelid induced during the relocation process.

It was also possible that the TST result in Jan 2002 was a false positive, either due to injection technique, exposure to environmental mycobacteria, or previous BCG vaccination. The strong concurrence of the PRIMAGAM™ result with the TST ruled out the first two possibilities. The response to bovine PPD was significantly greater than that to avian PPD, indicating infection with *M. bovis* or *M. tuberculosis*. As it was plausible that Julia had been given BCG in Gambia, ESAT-6 and CFP-10 were included in the IFN- γ assay in Feb 2002. These are experimental antigens, provided by the Statens Serum Institute, Denmark, and Cellestis Ltd, Australia. Both produced strongly positive results which clearly ruled out the possibility of a BCG reaction because these antigens are not present in the BCG genome. Only the result for the ESAT-6 assay appears in Table 1 because there was insufficient blood to quantify the CFP-10 result. These results confirmed that Julia is infected with *M. bovis* or *M. tuberculosis*. There is no indirect diagnostic test that can differentiate between these two organisms.

The source of Julia's infection has not been identified, however PRIMAGAM™ results from Jan 1998 are worth some attention. The OD Bovine PPD was > OD Avian PPD by 0.036, and OD Bovine PPD was > OD Nil antigen by 0.040. While both differences are less than the test cut-off point of 0.05, they are greater than those in all other adult gorillas tested (see Table 2), and these values may in fact be reflective of recent infection with TB. The protocol for screening humans following TB exposure is to perform two TSTs 3 mo apart, because CMI does not develop immediately following infection, and a case of early disease may be missed if the patient is only tested once.⁶ Australian quarantine protocols required Julia to be held in post arrival isolation for 60d, and a single TST performed in that time. The outcome of this case suggests that a longer post arrival quarantine period is appropriate for imported primates, including two TSTs 3 mo apart.

Subsequent to the diagnosis of TB in Julia, all other gorillas in the group and all personnel who had worked closely with her or her wastes were tested for TB using both TST and IFN- γ tests. Results of these tests are presented in Tables 2 and 3. All gorillas were negative for TB on both tests, but the IFN- γ results of Male #3 and Female #4 included a mild response to avian PPD which exceeded the bovine PPD response, indicating exposure to environmental mycobacteria. These are hand-reared infants which share an enclosure not accessed by other group members. The strong mitogen response reported for all gorillas ruled out the possibility of false negatives due to anergy. This is significant because all animals except Females #1 and #3 were infected with Varicella Zoster Virus either at, or close to, the time of testing. If TSTs alone had been performed, immunosuppression by concurrent disease would have been considered a possibility.

Nineteen staff members were tested, all of whom had been mantoux tested 1-4 yr earlier. Three people had significant conversions in their mantoux responses. One other person (Veterinarian) did not present for mantoux test reading but had a positive QuantiFERON®-TB result. All four had histories of BCG vaccination, but as they had shown no or negligible response to their previous mantoux, these recent reactions caused some concern. The IFN- γ assays proved very useful in the interpretation of these responses (see Table 3). The QuantiFERON®-TB results of Gorilla Keeper #1 showed a dominant response to avian PPD, indicating that her TST conversion was due to exposure to environmental mycobacteria. The IFN- γ assays of the other three were all positive for *M. tuberculosis* complex organisms, however their ESAT-6 and CFP-10 assays were negative, clearly indicating that their responses were to BCG, and they are not infected with *M. bovis* or *M. tuberculosis*. If IFN- γ assays had not been available, Gorilla Keepers #1 and #2 would have been diagnosed as having latent TB on the basis of existing criteria (mantoux induration >15mm in BCG vaccinees) and prescribed a 9 mo course of isoniazid. All other tested staff members showed no re-

cent mantoux conversions or significant IFN- γ results.

The use of IFN- γ assays in this investigation has permitted us to conclude at this stage that there is no evidence of disease spread from the infected gorilla. All contact gorillas and staff will be retested 3 mo after their first test. Meanwhile strict quarantine procedures are in place within the zoo.

ACKNOWLEDGEMENTS

The author would like to thank Dr. Stephen Jones of CSL Animal Health for performing the PRIMAGAM™, ESAT-6 and CFP-10 assays, and for his invaluable advice in the investigation of this case. Sincere thanks are also due to Dr. Jonathan Streeon for his generous advice and support in the investigation and management of the gorilla and contact personnel. Thank you also to Dr. Peter Anderson, Statens Serum Institute (Copenhagen, Denmark) and Dr. Jim Rothel, Cellestis Ltd. (Melbourne, Australia) for providing the experimental ESAT-6 and CFP-10 antigens, and to the staff of Melbourne Zoo for their professionalism and cheerful co-operation throughout the investigation.

LITERATURE CITED

- Anderson, P., M.E. Munk, J.M. Pollock and T.M. Doherty. 2000. Specific immune-based diagnosis of tuberculosis. *The Lancet* 356:1099–1104.
- C.S.L. Veterinary Division. 1998. Primagam™: Non-human primate gamma interferon test: an assay of cell mediated immunity and detection of tuberculosis infection in non-human primates. Manufacturers Instructions for Use. C.S.L. Limited, Melbourne, Australia.
- Desem, N. and S.L. Jones. 1998. Development of a human gamma interferon enzyme immunoassay and comparison with tuberculin skin testing for detection of *Mycobacterium tuberculosis* infection. *Clin. Diagn. Lab. Immunol.* 5(4):531–536.
- Mazurek, G.H., P.A. LoBue, C.L. Daley, J. Bernardo, A.A. Lardizabal, W.R. Bishai, M.F. Iademarco and J.S. Rothel. 2001. Comparison of a Whole Blood Interferon γ Assay with Tuberculin Skin Testing for Detecting Latent *Mycobacterium tuberculosis* Infection. *J. A.M.A.* 286(14):174–1747.
- Mikota, S.K. and J. Maslow. 1997. Theoretical and technical aspects of diagnostic techniques for mammalian tuberculosis. *Proc. Amer. Assoc. Zoo Vet.* 162–165.
- Streeon, J.A., N. Desem and S.L. Jones. 1998. Sensitivity and specificity of a gamma interferon blood test for tuberculosis infection. *Int. J. Tuberc. Lung Dis.* 2(6):443–450.
- Wood, P.R., L.A. Corner and P. Plackett. 1990. Development of a simple, rapid in vitro cellular assay for bovine tuberculosis based on the production of γ interferon. *Res. Vet. Sci.* 49:46–49.
- Wood, P.R. and S.L. Jones. 2001. Bovigam™: an in vitro diagnostic test for bovine tuberculosis. *Tuberculosis* 81 (1/2):147–155.

Tables described in the text are included at the end of the issue as an appendix

**MINUTES OF THE
TWENTY-FIRST ANNUAL GENERAL MEETING
AUSTRALASIAN PRIMATE SOCIETY
HELD 7TH DEC 2002 , MELBOURNE ZOO**

PRESENT:

Members:

P. Harper, P. Osborn, C. Brinkman, V. Young, M. Borovich, N. Wilson, J. Davis, L. Abra, L. Grossfeldt, L.Cocks, A. Embury, M. Leggoe, C. Baker, G. Crook, A. Manirakiza D. Williams

Visitors:

B. Lluna, R. Tupp, M.Marshall,

APOLOGIES

C. Litchfield, J.Munn, R. Markham, , L. Shanley

Graeme Crook chaired the meeting, which opened at 4.03pm. He apologised for the absence of the president, Carla Litchfield who is presently in Africa.

The Minutes of the previous meeting in Canberra was passed around for all to read.

There were 2 spelling errors, which were noted for correction, then Colin Groves proposed they be accepted, Seconder was Pauline Osborn and they were passed.

BUSINESS ARISING

The Secretary reported that the APS had become affiliated with PASA as per the Canberra meeting.

Colin Groves was still to try to chase up the books that were outstanding.

Alexis Manirakiza said that Wellington was still ok for the next meeting.

The Treasurer, Christine Baker then gave the Treasurer's Report.

There are three accounts:

Mountain Gorilla Survival Appeal which has a closing Balance of	\$174.44
Society Account No 2 (joint with Alby Mangels)	\$904.08
Society Account No 1	\$3729.71

Unfortunately Alby Mangels has not been around to be able to access the Account no2, so that moneys can be paid into Account No 1.

It was pointed out that the membership has not risen since 1986, and that income from membership is dwindling. There was some confusion by members not being aware of when their memberships became due. Graeme confirmed that members get one issue of the journal *gratis* if their membership is overdue. He also said that July 1st is the date for renewal and is much the easiest date for the Treasurer.

Amanda Embury suggested that there be a written reminder in the Newsletter and Cobie Brinkman suggested a different coloured address label. Both these ideas were noted and agreed to by the Editor.

Cobie Brinkman proposed that the membership be raised to \$30, for general membership, \$20

for students/unemployed, pensioner, \$40 for family and \$50 for corporate institutions. Christine Baker seconded this proposal, which was duly accepted. The price rise would start in 1st July, 2003

Christine said that she would look into the reminder system.

Graeme mentioned that up until 1995 the newsletter had been funded by various universities around the country, but is now fully funded by the Society.

Graeme Crook proposed that the Treasurer's Report be accepted, Penny Harper seconded, and it was accepted.

<ACTION>

- EDITOR - To print a written reminder in the newsletter when subs. are due, and use a different coloured label for those whom are unfinancial
- TREASURER – to look into an efficient reminder system.

PRESIDENT'S REPORT

No Report as President is in Uganda.

ELECTION OF OFFICERS

Chairman declared all positions vacant,

PRESIDENT - Graeme Crook

Christine Nominated Graeme Crook, who accepted the nomination, Leif Cocks seconded – carried.

VICE – PRESIDENT - Graham Strachan

Nominated by G. Crook, Seconded L. Grossfeldt, - carried

SECRETARY – Penny Harper

Nominated by P. Osborn, seconded by D. Williams – carried

TREASURER – Christine Baker

Nominated by G. Crook, seconded by L. Grossfeldt, - carried

EDITOR – Graeme Crook

Nominated by Christine Baker, seconded by P. Harper – carried

COUNCIL MEMBERS

LEIF COCKS – Nominated by C. Baker, sec. By P. Harper – carried

COLIN GROVES – Nominated by C. Baker, sec. L. Grossfeldt – carried

STATE REPS.

SA – Christine Baker – prop. P. Harper, sec. D. Williams –carried

NSW – Louise Grossfeldt – prop. L. Abra, sec. C. Baker – carried

VIC _ Deborah Williams – prop C. Groves, sec C. Brinkman – carried

WA – Rosemary Markham – prop L. Cocks sec P. Harper – carried

ACT – Colin Groves – prop P. Harper, sec L. Cocks – carried

NZ – Alexis Manirakiza – prop C. Baker sec. L. Grossfeldt – carried

TAS – Malcolm Marshall – prop. C. Baker sec P. Harper – carried

Q – Jo Davis – prop P. Harper, sec C. Baker – carried

NT – Marian St. Clair, nom G. Crook, sec C. Baker – carried

GENERAL BUSINESS

Lisa Abra spoke about her agenda item of the issue of one illegal and one legal transaction in the SE Asian region. She had been considering asking the APS to voice its disapproval of the import of gorillas to Taipei. However the situation appears to have been attended to by CITES and the animals are being sent to Limbe Sanctuary now.

The other issue she raised was about the legal transfer of some gorillas from Howlett's zoo to Raganan Zoo in Djakarta. The Indonesian Zoo does not have a demonstrated expertise in the keeping of gorillas. She was proposing that APS look into the possibility of asking Melbourne and Taronga Zoos to proffer advice in the husbandry of the gorillas.

There proceeded some discussion re this transfer, with it being pointed out by Amanda that Howlett's still retained ownership of the animals with the right to recover them if problems warranted that action. She also said that Howletts operate outside the EEP system and Australian Zoos work with the SE Asian region. Leif pointed out that Howletts was giving ongoing support to Raganan with the gorillas. It was suggested that the APS could approach ARAZPA for their opinion re offering advice. It was also suggested that we approach Howletts to see also what the situation actually is. Leif mentioned that the exhibit is new and big, but the worry is the long-term husbandry. Finance is also an issue, Leif said that Willy Smits has put a very large amount into it from a bequest from a German lady who used to live in the Raganan Zoo. This bequest is apparently specifically for the ongoing upkeep of the gorillas. It was decided that Amanda would write to ASMP to see what advice or approach would be best from Melbourne and Taronga Zoos. The Secretary was to write to Howlett's to obtain clarification of the position, re ongoing support.

<ACTION>

- The Secretary – to draft a letter to Howlett's to enquire about ongoing support and advice re the longterm husbandry of gorillas
- Amanda Embury – To write to the ASMP to see what advice or approach would be best from Australian zoos with gorilla expertise.

Alexis suggested that now that we are affiliates of PASA, that we be its "eyes and ears" to report on any problems found with welfare issues of primates. Graeme offered for anyone finding problems to report to the APS Council.

Lisa the brought up the issue of the dreadful fires in Kalimantan and she expressed interest in the APS doing something to help. There are many orangs affected by the fires and increasing the work of the rehab. Centres. She proposed that APS link in some way with fundraising. Graeme said he was more than happy to help with articles on the website. Leif said there could be link from APS to AOP, which supports the Rehab. Centres and can give tax deductibility for donations. There was a proposal to start up an email database to link in with AOP, in this way more people can receive the petitions, etc.

Penny Harper asked about the possibility of the APS assisting Debby Cox with the need to set

up a second sanctuary for the chimpanzees in Uganda. It was suggested that the small amount we could give would not make much of a dent in the total cost, and Amanda suggested that we ask Debby for a "wish list" so we could decide whether to help with a specific need. Debby is coming over to Sydney in Feb to do some fundraising and it was suggested that we could hand over a donation publicly. It was also pointed out that we had already supported Debby in the past, and would it be better to support some thing new?

Leif suggested that the APS give a contribution to Conservation of \$1000, and this had to be bid for, with the executive deciding the winning bid.

D. Williams put this in a proposal, Leif Sec, - carried that the proposals, or bids, be put in by March 31st 2003 for consideration.

Cobie suggested that one way of saving money would be to offer to send the Newsletter via email rather than printed hard copy.

<ACTION>

- EDITOR – to send newsletters by email where possible

Cobie also put forward the proposal that we give medals for excellence in various fields,, eg scientific, zoo work,etc. Graeme asked her to look into this, costs, etc.

<ACTION>

- Cobie to look into and research the cost the proposal for medals and report to the Council.

Penny Harper proposed that the Society send Lyn Shanley a card etc as she is in hospital. She has recently had an experimental operation, but her long-term prognosis is poor. It was decided that the APS would send her a copy of Leif's book which people duly signed and the Secretary took with her to hand on to Lyn when she got home.

<ACTION>

- Secretary – to send the card and book to Lyn Shanley - Done

Colin asked for more scientific papers for journal as standard seems to be dwindling into articles only.

Graeme asked Amanda if she could send him the abstracts electronically.

<ACTION>

- Amanda Embury to send Graeme the abstracts from the Melb. Conference electronically.

NEXT CONFERENCE

IT was decided that Alexis would confirm with the Wellington Zoo's management and it would be held on the first weekend in Dec. 2003

<ACTION>

- Alexis to confirm with Wellington Zoo re the conference on the first weekend in Dec.

2003

There were suggestions for the following conference at Mogo Zoo or Australia Zoo?
Meeting closed 5.35pm

Book Notice
GORILLA BIOLOGY
A MULTIDISCIPLINARY PERSPECTIVE

Edited by Andrea B. Taylor and Michele L. Goldsmith

Cambridge University Press 2003

FROM THE BACK COVER

Gorillas are one of our closest living relatives, the largest of all living primates, and they teeter on the brink of extinction. These fascinating animals are the focus of this in-depth and comprehensive examination of gorilla biology. *Gorilla Biology* combines recent research in morphology, genetics, and behavioral ecology to reveal the complexity and diversity of gorilla populations. The first two sections focus on morphological and molecular variation and underscore the importance of understanding diverse biological patterns at all levels in testing evolutionary and adaptive hypotheses and elucidating subspecies and species diversification. The following section investigates the influence of ecological variables on gorilla social organization, and highlights the surprising behavioral flexibility of this genus. The book ends with discussions of the conservation status of gorillas and the many and increasing threats to their continued survival. Giving insight into the evolutionary biology of these unique primates, this book will be essential reading for primatologists, anthropologists, and evolutionary biologists.

ANDREA B. TAYLOR is Assistant Professor in the Departments of Community and Family Medicine and Biological Anthropology and Anatomy at Duke University Medical Center. For the past 10 years she has studied the comparative anatomy of the African apes, focusing on the ontogeny of the musculoskeletal system to understand better the developmental and evolutionary basis of functional and adaptive differences in morphology.

MICHELE L. GOLDSMITH is Assistant Professor in the Department of Environmental and Population Health at Tufts University School of Veterinary Medicine. As a primatologist, she has spent the past 12 years studying the comparative behavioral ecology of both lowland and mountain gorillas, and most recently is examining the impact of tourism on gorilla behavior.

TABLE OF CONTENTS

List of contributors, xiii Acknowledgments, xix

Introduction: Gorilla biology: Multiple perspectives on variation within a genus ANDREA B.

TAYLOR and MICHELE L. GOLDSMITH

- Part 1 Gorilla taxonomy and comparative morphology 9
1. An introductory perspective: Gorillas - How important, how many, how long? RUSSELL H. TUTTLE, 11
 2. A history of gorilla taxonomy COLIN P. GROVES, 15
 3. Patterns of diversity in gorilla cranial morphology REBECCA M. STUMPF, JOHN D. POLK, JOHN F. DATES, WILLIAM L. JUNGERS, CHRISTOPHER P. HEESY, COLIN P. GROVES, and JOHN G. FLEAGLE, 35
 4. The hierarchy of intraspecific craniometric variation in gorillas: A population-thinking approach with implications for fossil species recognition studies GENE H. ALBRECHT, BRUCE R. GELVIN, and JOSEPH M.A. MILLER, 62
 5. Morphological differentiation of Gorilla subspecies STEVEN R. LEIGH, JOHN H. RELETFORD, PAUL PARK, and LYLE W. KONIGSBERG, 104
 6. Ontogeny and function of the masticatory complex in Gorilla: Functional, evolutionary, and taxonomic implications ANDREA B. TAYLOR, 132
 7. Intraspecific and ontogenetic variation in the forelimb Morphology of Gorilla SANDRA E. INOUE, 194
- Part 2 Molecular genetics 237
8. An introductory perspective: Gorilla systematics, taxonomy, and conservation in the era of genomics OLIVER A. RYDER, 239
 9. Mitochondrial and nuclear DNA estimates of divergence between western and eastern gorillas MICHAEL I. JENSEN-SEAMAN, AMOS S. DEINARD, and KENNETH K. KIDD, 247
 10. Genetic studies of western gorillas STEPHEN L. CLIFFORD, KATE A. ABERNETHY, LEE J.T. WHITE, CAROLINE E.G. TUTIN, MIKE W. BRUFORD, and E. JEAN WICKINGS, 269
- Part 3 Behavioral ecology 293
11. An introductory perspective: Behavioral ecology of gorillas CAROLINE E. G. TUTIN, 295
 12. Gorilla social relationships: A comparative overview DAVID P. WATTS, 302
 13. Within-group feeding competition and socioecological factors influencing social organization of gorillas in the Kahazi-Biega National Park, Democratic Republic of Congo JUICHI YAMAGIWA, KANYUNYI BASABOSE, KISWELE KALEME, and TAKAKAZU YUMOTO, 328
 14. Comparative behavioral ecology of a lowland and highland gorilla population: Where do Bwindi gorillas fit? MICHELE L. GOLDSMITH, 358
 15. Are gorillas vacuum cleaners of the forest floor? The roles of body size, habitat, and food preferences on dietary flexibility and nutrition MELISSA J. REMIS, 385
- Part 4 Gorilla conservation 405
16. An introductory perspective: Gorilla conservation ALEXANDER H. HARCOURT, 407
 17. The current status of gorillas and threats to their existence at the beginning of a new millennium ANDREW J. PLUMPTRE, ALASTAIR McNEILAGE, JEFFERSON S. HALL, and ELIZABETH A. WILLIAMSON, 414
 18. Distribution, taxonomy, genetics, ecology, and causal links of gorilla survival: The need to develop practical knowledge for gorilla conservation ESTEBAN E. SARMIENTO, 432
 19. The Cross River gorilla: Natural history and status of a neglected and critically endangered subspecies JOHN F. DATES, KELLEY L. McFARLAND, JACQUELINE L. GROVES, RICHARD

A. BERGL, JOSHUA M. LINDER, and TODD R. DISOTELL, 472

Afterword MICHELE L. GOLDSMITH and ANDREA B. TAYLOR, 498

Index, 501

CONTRIBUTORS

Kate A. Abernethy Department of Molecular and Biological Sciences University of Stirling Stirling FK9 4LA, U.K.

Gene H. Albrecht Department of Cell and Neurobiology Keck School of Medicine University of Southern California Los Angeles, CA 90089, U.S.A.

Kanyunyi Basabose Centre de Recherche en Sciences Naturelles Lwiro, D.S. Bukavu Democratic Republic of Congo

Richard A. Bergl PhD Program in Anthropology CUNY Graduate Center
365 Fifth Avenue New York, NY 10016, U.S.A.

Mike W. Bruford Cardiff School of Biosciences Cardiff University Cardiff CF1 3TL, U.K.

Stephen L. Clifford Centre International de Recherche s Medic ales Franceville (CIRMF) BP 769 Franceville, Gabon

Amos S. Deinard School of Veterinary Medicine University of California-Davis Davis, CA 95616, U.S.A.

Todd R. Disotell Department of Anthropology New York University
25 Waverly Place New York, NY 10003, U.S.A.

John G. Fleagle Department of Anatomical Sciences Heath Sciences Center and Interdepartmental Doctoral Program in Anthropological Sciences State University of New York Stony Brook, NY 11794, U.S.A.

Bruce R. Gelvin Department of Anthropology California State University Northridge, CA 91330, U.S.A.

Michele L. Goldsmith Department of Environmental and Population Health Tufts University School of Veterinary Medicine North Grafton, MA 01536, U.S.A.

Colin P. Groves Department of Archaeology and Anthropology Australian National University Canberra, A.C.T. 0200 Australia

Jaqueline L. Groves Department of Biological Sciences University of Sussex Falmer BN1 9RH, U.K.

Jefferson S. Hall Department of Forestry Yale University New Haven, CT 06520, U.S.A.

Alexander H. Harcourt Department of Anthropology University of California-Davis
1 Shields Avenue Davis, CA 95616, U.S.A.

Christopher P. Heesy Interdepartmental Doctoral Program in Anthropological Sciences State University of New York Stony Brook, NY 11794, U.S.A.

Sandra E. Inouye Department of Anatomy Chicago College of Osteopathic Medicine Midwestern University
555 31st Street Downers Grove, IL 60515, U.S.A.

Michael I. Jensen-Seaman Human and Molecular Genetics Center Medical College of Wisconsin Milwaukee, WI 53226, U.S.A.

William L. Jungers Department of Anatomical Sciences Heath Sciences Center and Interdepartmental Doctoral Program in Anthropological Sciences State University of New York Stony Brook, NY 11794, U.S.A.

Kiswele Kaleme Centre de Recherche en Sciences Naturelles Lwiro, D.S. Bukavu Democratic Republic of Congo

- Kenneth K. Kidd Department of Genetics Yale University New Haven, CT 06520, U.S.A.
Lyle W. Konigsberg Department of Anthropology University of Tennessee Knoxville, TN 37996, U.S.A.
Steven R. Leigh Department of Anthropology University of Illinois-Urbana Urbana, IL 61801, U.S.A.
Joshua M. Linder PhD Program in Anthropology CUNY Graduate Center
365 Fifth Avenue New York, NY 10016, U.S.A.
Kelley L. McFarland PhD Program in Anthropology CUNY Graduate Center
365 Fifth Avenue New York, NY 10016, U.S.A.
Alastair McNeilage Wildlife Conservation Society
2300 Southern Boulevard Bronx, NY 10460, U.S.A.
Joseph M.A. Miller Department of Pathology and Laboratory Medicine School of Medicine
University of California-Los Angeles Los Angeles, CA 90095, U.S.A.
John F. Oates Department of Anthropology Hunter College CUNY Graduate Center
365 Fifth Avenue New York, NY 10016, U.S.A.
Paul B. Park Department of Anthropology University of Illinois-Urbana Urbana, IL 61801, U.S.A.
Andrew J. Plumptre Wildlife Conservation Society
2300 Southern Boulevard Bronx, NY 10460, U.S.A.
John D. Polk Interdepartmental Doctoral Program in Anthropological Sciences State University of New York Stony Brook, NY 11794, U.S.A.
John H. Relethford Department of Anthropology State University of New York College at Oneonta Oneonta, NY 13820, U.S.A.
Melissa J. Remis Department of Sociology/Anthropology Purdue University West Lafayette, IN 47907, U.S.A.
Oliver A. Ryder Center for Reproduction of Endangered Species Zoological Society of San Diego San Diego, CA 92112, U.S.A.
Esteban E. Sarmiento Department of Mammology American Museum of Natural History Central Park West and 79th Street New York, NY 10024, U.S.A.
Rebecca M. Stumpf Interdepartmental Doctoral Program in Anthropological Sciences State University of New York Stony Brook, NY 11794, U.S.A.
Andrea B. Taylor Departments of Community and Family Medicine and Biological Anthropology and Anatomy Duke University Medical Center Durham, NC 27710, U.S.A.
Caroline E. G. Tutin Centre International de Recherches Medicales Franceville (CIRMF) BP 769 Franceville, Gabon
Russell H. Tuttle Department of Anthropology University of Chicago Chicago, IL 60637, U.S.A.
David P. Watts Department of Anthropology Yale University New Haven, CT 06520, U.S.A.
Lee J.T. White Wildlife Conservation Society
2300 Southern Boulevard Bronx, NY 10460, U.S.A.
E. Jean Wickings Centre International de Recherches Medicales Franceville (CIRMF) BP 769 Franceville, Gabon
Juichi Yamagiwa Laboratory of Human Evolution Studies Faculty of Science Kyoto University Sakyo, Kyoto 606-8502, Japan
Takakazu Yumoto Center for Ecological Research Kyoto University Otsu, Shiga 520-2113, Japan

WHERE TO ORDER

Cambridge University Press

40 West 20th Street New York, NY 10011-4211, USA
Phone: 1-800-872-7423 Fax: 914-937-4712 Web site: <http://www.cambridge.org>
Price:
\$ 90.00 (Hardbound) ISBN: 0-5217-9281-9

World Heritage Biodiversity Hot Spots to Get \$15M

WASHINGTON, DC, November 20, 2002 (ENS) - Places that are the richest in their variety of unique animals and plants are often the places most jeopardized by development, even though they may be designated as World Heritage sites by the United Nations.

To protect and conserve these most threatened biodiversity hot spots, Conservation International and the United Nations Foundation have formed a new three year, \$15 million partnership.

The southern muriqui *Brachyteles arachnoides* is one of the most threatened primates in Brazil's Atlantic Forest. The partnership was announced Friday in Venice at an international congress entitled "World Heritage 2002: Shared Legacy, Common Responsibility" hosted by the UN Educational, Scientific, and Cultural Organization (UNESCO) to mark its 30th anniversary.

As presented jointly by president of the UN Foundation, Timothy Wirth, and president of Conservation International, Russell Mittermeier, the partnership aims to enhance the impact of the 1972 UNESCO World Heritage Convention, which works with UN member countries to identify and protect sites of natural or cultural heritage.

Working with UNESCO, the UN Foundation and Conservation International (CI) seek to collaborate on the development of projects in proposed or existing natural World Heritage Sites. Of the 730 designated World Heritage Sites, 144 have been inscribed as natural sites.

UNESCO Director-General Koïchiro Matsuura said, "By partnering with the World Heritage Centre, the UN Foundation has strengthened our capacities to reach our objectives and attract new partners for World Heritage conservation."

The principle aim of the World Heritage Congress was the development of just such targeted partnerships for site protection and preservation, Matsuura said.

UN Foundation president Timothy Wirth spent more than 20 years serving in the U.S. Congress, first as a Congressman and then as a Senator, representing Colorado.

Wirth said, "These partnerships help sustain both communities and the future of humanity by preserving our world's most treasured resources."

Created to administer Ted Turner's \$1 billion pledge in support of the United Nations, the UN Foundation promotes replicable conservation approaches, builds greater public awareness about the need to protect biodiversity, and creates effective partnerships to bring additional resources to World Heritage sites.

The UN Foundation has identified the conservation of biodiversity as one of its top priorities, and is supporting World Heritage sites through strategic grant making.

"With 16 out of 25 global biodiversity hotspots having World Heritage Sites, this partnership will be tremendously beneficial in providing the essential on-the-ground work to protect them," said CI's Mittermeier, a primatologist who chairs the Primate Specialist Group of the IUCN-World Conservation Union Species Survival Commission

CI's strategic focus emphasizes protection of the world's 25 global biodiversity hotspots, where more than 60 percent of all terrestrial species diversity is found within just 1.4 percent of the Earth's

land surface.

"This is exactly the kind of important partnership Conservation International welcomes to successfully implement our global ecosystem approach of conserving biodiversity," said Mittermeier.

Nearly half the world's vascular plant species and one-third of terrestrial vertebrate species are endemic to 25 hotspots of biodiversity, but none of these hotspots has more than one-third of its habitat remaining intact, says CI. Once these hotspots covered 12 percent of the earth's land surface, but today they cover only 1.4 percent.

The Everglades National Park in the United States was inscribed on the List of UNESCO World Heritage in Danger in 1993. It has suffered extensive damage due to urban growth, pollution from fertilizers, mercury poisoning of fish and wildlife, and a fall in water levels caused by flood protection measures.

Up to \$15 million will support initiatives developed collaboratively by the UN Foundation, Conservation International, and UNESCO's World Heritage Center. They will target regions where focus could generate significant conservation results.

A recent collaboration between the UN Foundation, CI, and Flora and Fauna International led to the Cambodian government's decision to designate a 1,000,000 acre (402,000 hectare) area in southwestern Cambodia's Central Cardamom Mountains as a protected area.

The Cardamoms, which Cambodia plans to nominate as a World Heritage site, are inhabited by most of Cambodia's large mammals and half of the country's birds, reptiles and amphibians.

Visit each of the 25 biodiversity hotspots at: <http://www.biodiversityhotspots.org/>

The UN Foundation is found online at: <http://www.unfoundation.org/>

UNESCO's World Heritage Sites are online at: www.unesco.org/whc/heritage.htm

Census finds 5 000 chimpanzees in Uganda

Kampala, Uganda - There are nearly 5 000 chimpanzees living in Uganda, according to a recently completed census, but continued hunting and human encroachment on their habitat could reduce that number, said scientists on Tuesday.

The census took four years to complete and was conducted in 22 forests in western Uganda by scientists and workers from the Jane Goodall Institute, based in Silver Spring, Maryland, and the New York-based Wildlife Conservation Society, said Derby Cox, the executive director of the institute's Ugandan branch. Cox said the census was the first of its kind carried out in Uganda. Earlier government estimates put the country's total chimpanzee population about four thousand, a marked difference from the 4 950 chimps counted in the census. Cox said she did not think the difference represented a growth in the Ugandan chimpanzee population. "The figure of four thousand was just a guess," she said.

But, Moses Mapesi, director of field operations at the government's Uganda Wildlife Authority, said the census showed the chimpanzee population was growing. He attributed the growth to efforts by government conservation officials to educate people about the primates, programmes encouraging farmers not to plant crops that chimpanzees eat and tough enforcement of anti-poaching laws. Regardless, chimpanzees remain threatened in Uganda and throughout Africa, said Cox.

Human encroachment on the forests where they dwell, continued hunting and deforestation have contributed to shrinking chimpanzee populations, said Cox. Between 100,000 and 150,000 chimpanzees live in 21 African countries, she said.

Populations have already been wiped out in five central African countries where chimpanzee

meat is highly sought after.

"Unless serious measures are put in place in the next decade, the populations of chimps will be extinct in 10 more countries," said Cox. She cited the case of Burundi, a central African nation where only about 400 chimpanzees remain.

To help sustain Uganda's chimpanzee population, the Goodall Institute and the Wildlife Conservation Society have come up with a five-year plan that focuses on resolving conflicts between chimpanzees and people who live and farm land near the forests where the primates dwell.

"People grow crops near the chimp areas and encroach on them. They cut down forests," she said. "We have to resolve these problems and see that people in these conservation areas do not lose and the chimps survive." The Goodall Institute runs a chimpanzee sanctuary on an island in Lake Victoria along with other conservation groups. About 41 of the primates, nearly all of which were rescued from poachers in neighbouring Congo, live at the sanctuary. - Sapa-AP

New Population of Orangutans Discovered

WASHINGTON, DC, November 22, 2002 (ENS) - The known number of orangutans in the world has increased by about 10 percent, thanks to a remarkable discovery by a team of researchers surveying a remote forest on the southeast Asian island of Borneo. The discovery by the team from The Nature Conservancy offers a rare opportunity for conservationists working to save the endangered primate.

The research teams documented 1,600 orangutan nests, indicating that between 1,000 and 2,500 orangutans are living within a 540 square mile (1,399 square kilometer) area of lowland forests in the province of East Kalimantan, part of the Indonesian portion of Borneo. This is the largest viable population of wild orangutans known to exist in East Kalimantan, a province about the size of New England.

"This find represents one of the last, best chances to protect a large, healthy population of wild orangutans anywhere in the world," said Steve McCormick, president and CEO of the U.S. based Nature Conservancy.

Orangutan experts echoed the Conservancy's excitement over this find. Earlier this month, the nonprofit Orangutan Foundation International (OFI) reported that the orangutan faces almost certain extinction within the next five to 10 years if the current trend in illegal logging and forest loss continues in its Indonesian rain forest habitat. The newly discovered orangutan population offers new hope, said Dr. Birute Mary Galdikas, president of OFI.

"The discovery of a large, biologically viable, previously unsurveyed orangutan population in East Kalimantan is very significant," Galdikas said. "This find extends the orangutan's known range and gives us hope that we can save orangutan populations from extinction in the wild."

The Nature Conservancy team used a survey plan developed by Harvard University primate expert Andrew Marshall. Because spotting the rare and elusive orangutan is difficult and takes a very long time, Conservancy consultants recruited and trained indigenous Dayaks to identify and count orangutan nests, an accepted method for assessing the size of orangutan populations.

Using the survey results, Marshall then calculated the size of the orangutan population.

"Given that conservation funds are always limited and that political support and logistical constraints vary in different places, it is crucial that financial resources be focused on areas where

the chances of protecting viable orangutan populations are greatest," Marshall said. "The orangutan habitat area in East Kalimantan is one of those places."

On Wednesday, the Conservancy signed a joint declaration with the Berau District of East Kalimantan - the district in which the orangutan population is located - and the Indonesian Ministry of Forestry, committing all three parties to conserving and managing orangutan habitat in the district. The document states that the central and local Indonesian governments and the Conservancy recognize the orangutan's importance and the need to conserve its habitat. The parties also pledged to protect the function and ecology of the orangutan habitat area and agree to promote forest conservation through forest certification. While the forest where the new orangutan population was found has not been heavily logged, it is facing pressure from both legal and illegal logging operations.

An estimated 14,000 to 25,000 orangutans are left in the wild, found only on Borneo and Sumatra, another southeast Asian island. Primate experts have predicted that orangutans will be extinct in the wild by the year 2020 unless immediate steps are taken to address threats to the animals' survival.

In 1997 and 1998, fires sparked by loggers and farmers clearing land destroyed more than five million hectares (12.3 million acres) of forest in Kalimantan, devastating orangutan populations and slashing the amount of habitat available to survivors. The orangutan continues to lose habitat to uncontrolled deforestation and habitat fragmentation, and poachers regularly take the primates for food and the pet trade. For example, Indonesia, home to some of the Earth's most biologically diverse and threatened tropical forests, is also the world's top supplier of wood. It is estimated that 70 percent of the wood taken from Indonesian forests is harvested illegally. To combat the threats to orangutans posed by unsustainable and illegal logging, The Nature Conservancy is working with local East Kalimantan communities and the Indonesian government to create economic incentives to manage forests sustainably and protect prime habitat. The Home Depot, a major hardware and home improvement chain, has pledged \$1 million to the Conservancy, to be used over the next five years to combat illegal logging and promote sustainable timber harvesting. The Home Depot is the largest single buyer of wood in the United States, so the company's commitment is expected to have a major influence on the rest of the industry, even though less than one percent of the company's wood supply comes from Indonesia.

"The Home Depot has led the retail industry toward sustainable forestry by using its purchasing dollars to show the company's preference for certified wood," said Ron Jarvis, The Home Depot merchandising vice president for lumber and building materials.

The gift from The Home Depot augments funding provided since 2001 by the U.S. Agency for International Development for the conservation of orangutan habitat, combating illegal logging and promoting sustainable forest practices through work with the timber industry, local governments and indigenous Dayak villagers. Additional funding provided by the U.S. Fish and Wildlife Service and private donors is paying for further orangutan surveys and other key habitat conservation efforts.

Membership update

Active Membership in the Society has been steadily dropping for several years, especially in Adelaide, Melbourne and Sydney. The state representatives have been asked to raise the profile of the Society in their state and to attempt to get more people interested in our work and to become members. I would like to ask all members to promote the Society whenever they get the opportunity because without you being active and supporting the Society, it will cease to be. We have the chance to make a difference, to educate people and raise urgently required funds to assist in the conservation of primates in the wild, act as a source of information to anyone who works with or cares about the primates of the world, in the wild and in captivity, in zoos, laboratories and breeding colonies

AUSTRALASIAN PRIMATE SOCIETY

MEMBERSHIP FORM

TO MR G A CROOK
PO BOX 500
ONE TREE HILL
SOUTH AUSTRALIA 5114

*NEW
RENEWAL

*ORDINARY \$25
STUDENT/ CONCESSIONAL \$15
FAMILY/ INSTITUTION \$35

*Strike out whichever is not applicable

NAME _____

ADDRESS _____

PHONE _____ EMAIL _____ FAX _____

All Cheques and Money Orders should be made payable to "Australasian Primate Society"

or
Please debit my credit card

MasterCard Visa Bankcard

Account Number

Expiry Date

Signature _____ Date _____

Please indicate if you would like to receive *Australasian Primatology* electronically Yes/ No