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PUBLICATIONS OF RELEVANCE TO PAPUA NEW GUINEA AND MELANESIA

Bibliographic Citation List generated from MEDLARS

- 1 **Capelli C, Wilson JF, Richards M, Stumpf MP, Gratrix F, Oppenheimer S, Underhill P, Pascali VL, Ko TM, Goldstein DB.**
A predominantly indigenous paternal heritage for the Austronesian-speaking peoples of insular Southeast Asia and Oceania.
Am J Hum Genet 2001 Feb;68(2):432-443.
Modern humans reached Southeast Asia and Oceania in one of the first dispersals out of Africa. The resulting temporal overlap of modern and archaic humans and the apparent morphological continuity between them has led to claims of gene flow between *Homo sapiens* and *H. erectus*. Much more recently, an agricultural technology from mainland Asia spread into the region, possibly in association with Austronesian languages. Using detailed genealogical study of Y chromosome variation, we show that the majority of current Austronesian speakers trace their paternal heritage to Pleistocene settlers in the region, as opposed to more recent agricultural immigrants. A fraction of the paternal heritage, however, appears to be associated with more recent immigrants from northern populations. We also show that the northern Neolithic component is very unevenly dispersed through the region, with a higher contribution in Southeast Asia and a nearly complete absence in Melanesia. Contrary to claims of gene flow (under regional continuity) between *H. erectus* and *H. sapiens*, we found no ancestral Y chromosome lineages in a set of 1,209 samples. The finding excludes the possibility that early hominids contributed significantly to the paternal heritage of the region.
- 2 **Chapman HF, Kay BH, Ritchie SA, van den Hurk AF, Hughes JM.**
Definition of species in the *Culex sitiens* subgroup (Diptera: Culicidae) from Papua New Guinea and Australia.
J Med Entomol 2000;37(5):736-742.
Japanese encephalitis is a disease of major importance in Asia, which from 1995 has extended its range into the north of Australia. *Culex annulirostris* Skuse of the *Culex sitiens* subgroup of *Culex* was incriminated as the most likely mosquito vector. Because misidentifications previously have occurred within this subgroup, our paper defines electrophoretic methods to identify *Culex* specimens from Queensland and the Northern Territory in Australia and from Western Province in Papua New Guinea. In collections from 1996 to 1998 *Culex sitiens* Wiedemann, *Cx. palpalis* Taylor, and *Cx. annulirostris* comprised 93.1% of the total banded proboscis *Culex* mosquitoes collected; 6.9% remained unidentified to species by morphological or electrophoretic examination. The prevalence of *Cx. palpalis* was variable and appeared to be associated with below average rainfall during 1997. In Papua New Guinea, this species comprised up to 97.4% of banded proboscis *Culex*, with smaller numbers collected from the Torres Strait Islands and Cape York; none was collected from other Queensland localities. *Cx. annulirostris* was more prevalent during years of average or above average rainfall and was predominant in most localities, especially in the Torres Strait and Queensland. These data confirmed the problems in separating *Cx. sitiens* from *Cx. palpalis* and *Cx. annulirostris* using morphological characters.
- 3 **Diamond JM.**
Talk of cannibalism.
Nature 2000; 407(6800):25-26.
- 4 **Grace RF, Lesteur T, Sala T, Stewart J.**
A randomized comparison of low-dose ketamine and lignocaine infiltration with ketamine-diazepam anaesthesia for post-partum tubal ligation in Vanuatu.
Anaesth Intensive Care 2001 Feb;29(1):30-33.
Ketamine remains one of the most commonly used anaesthetic agents around the world. Despite it being the anaesthetic agent of choice in many developing nations, there is a paucity of literature describing ketamine in the developing world. In what we believe is the first randomized controlled trial to be performed in Vanuatu (formerly the New Hebrides) we compared the use of ketamine 0.9 mg/kg and diazepam 0.07 mg/kg with ketamine 0.3 mg/kg and 2% lignocaine infiltration in 50 Melanesian women undergoing post-partum tubal ligation. All women received 0.5 mg/kg intramuscular pethidine. Visual analog pain scores and verbal numeric satisfaction scores were similar between the groups. However, the time to obeyed command was significantly faster in the 0.3 mg/kg ketamine group (7.0±4.9 vs 13.0±9.2 minutes). The incidence of dreaming was similar and the content rated as pleasant by both groups. In institutions where post-anaesthesia care resources are limited, 0.3 mg/kg ketamine with local anaesthesia provides for earlier self-care of patients after tubal ligation, without compromise of analgesia, emergence or satisfaction. The implications of these findings extend to other procedures that require short general anaesthesia, which can be adequately performed with low-dose ketamine and local anaesthesia. The latter technique allows more rapid awakening.
- 5 **Hii JLK, Smith T, Vounatsou P, Alexander N, Mai A, Ibam E, Alpers MP.**

Area effects of bednet use in a malaria-endemic area in Papua New Guinea.

Trans R Soc Trop Med Hyg 2001 Jan-Feb;95(1):7-13.

Relationships between area coverage with insecticide-free bednets and prevalence of *Plasmodium falciparum* were investigated in 7 community-based surveys over a 33-month period in 1990-1993 in 6 villages in the Wosera area of Papua New Guinea. Spatial patterns in circumsporozoite rates for *P. falciparum*, *P. vivax* isomorphs K210 and K247, and *P. malariae*, and the proportions of mosquito blood meals positive for specific human, goat, cat, dog and pig antigens were determined using ELISAs. *P. falciparum* prevalence in humans was better explained by bednet coverage in the immediate vicinity than by personal protection alone. Circumsporozoite rates for both *P. falciparum* and *P. vivax* were also inversely related to coverage with bednets. There was some increase in zoophagy in areas with high coverage, but relatively little effect on the human blood index or on overall mosquito densities. In this setting, protracted use of untreated bednets apparently reduces sporozoite rates, and the associated effects on prevalence are greater than can be accounted for by personal protection. Even at high bednet coverage most anophelines feed on human hosts, so the decreased sporozoite rates are likely to be largely due to reduction of mosquito survival. This finding highlights the importance of local vector ecology for outcomes of bednet programmes and suggests that area effects of untreated bednets should be reassessed in other settings.

6 **Hodder AN, Crewther PE, Anders RF.**

Specificity of the protective antibody response to apical membrane antigen 1.

Infect Immun 2001 May;69(5):3286-3294.

Apical membrane antigen 1 (AMA1) is considered one of the leading candidates for inclusion in a vaccine against blood stages of *Plasmodium falciparum*. Although the *ama1* gene is relatively conserved compared to those for some other potential vaccine components, numerous point mutations have resulted in amino acid substitutions at many sites in the polypeptide. The polymorphisms in AMA1 have been attributed to the diversifying selection pressure of the protective immune responses. It was therefore of interest to investigate the impact of sequence diversity in *P. falciparum* AMA1 on the ability of anti-AMA1 antibodies to inhibit the invasion of erythrocytes in vitro by *P. falciparum* merozoites. For these studies, we used antibodies to recombinant *P. falciparum* 3D7 AMA1 ectodomain, which was prepared for testing in early clinical trials. Antibodies were raised in rabbits to the antigen formulated in Montanide ISA720, and human antibodies to AMA1 were isolated by affinity purification from the plasma of adults living in regions of Papua New Guinea where malaria is endemic. Both rabbit and human anti-AMA1 antibodies were found to be strongly inhibitory to the invasion of erythrocytes by merozoites from

both the homologous and two heterologous lines of *P. falciparum*. The inhibitory antibodies targeted both conserved and strain-specific epitopes within the ectodomain of AMA1; however, it appears that the majority of these antibodies reacted with strain-specific epitopes in domain I, the N-terminal disulfide-bonded domain, which is the most polymorphic region of AMA1.

7 **Inaba H, Ohmae H, Kano S, Faarado L, Boaz L, Leafasia J, Suzuki M.**

Variation of incubation time in an in vitro drug susceptibility test of *Plasmodium falciparum* isolates studied in the Solomon Islands.

Parasitol Int 2001 Mar;50(1):9-13.

A study on chloroquine resistance of *falciparum* malaria was conducted in the Solomon Islands. Both in vitro and clinical tests were performed. In our regular studies of in vitro chloroquine susceptibility tests on *Plasmodium falciparum* from non-immunes in Japan, the threshold point to differentiate resistant and susceptible isolates was set at 0.114 µM chloroquine in the semi-micro culture system, and this point was also applicable in the study of the malaria parasites taken in the highly endemic malarious area with good coincidence with clinical observation. Variation in the incubation time (24-63 hours) to reach the schizont stage of the isolated parasites was noted. It appeared that chloroquine-resistant *P. falciparum* showed traits to reach the schizont stage within a shorter incubation period.

8 **Juliger S, Luckner D, Mordmuller B, May J, Weierich A, Lell B, Luty A, Kremsner PG, Kun JK.**

Promoter variants of the human mannose-binding lectin gene show different binding. *Biochem Biophys Res Commun* 2000;275(2):617-622.

Mannose-binding lectin (MBL) levels in the plasma of humans are highly variable. The level is influenced by gene mutations in exon1 and the promoter. Here we describe the distribution of three point mutations linked with a deletion in the MBL gene promoter in populations of Central Africa, Thailand, and Papua New Guinea. Among African children we find 20% with the wild-type allele, 53% are heterozygous, and 27% are homozygous for the mutation. In Thailand we find 65% with the wild-type allele, 33% are heterozygous, and 2% are homozygous for the variant. In Papua New Guinea the polymorphism is not found. The occurrence of the mutation was associated with MBL levels in the plasma ($p = 0.043$). Oligonucleotides derived from the variant promoter regions bind proteins differently according to their DNA sequence. The binding of proteins can be influenced by induction with interleukin-6.

9 **Khan MR, Kihara M, Omoloso AD.**

Antibacterial activity of *Picrasma javanica*.

Fitoterapia 2001 May;72(4):406-408.

The methanol extracts of *Picrasma javanica*, leaves, seeds, stem and root barks were partitioned

(petrol, dichloromethane, ethyl acetate, butanol). All obtained extracts and fractions showed a broad spectrum of antibacterial activity, while none was active against the tested moulds.

10 **Khan MR, Kihara M, Omoloso AD.**

Antimicrobial activity of *Horsfieldia helwigii* and *Melia azedarach*.

Fitoterapia 2001 May;72(4):423-427.

The methanol extracts of leaves, root and stem barks of *Horsfieldia helwigii* and *Melia azedarach* showed a broad spectrum of antibacterial activity. The activity was increased on fractionation (petrol, dichloromethane, ethyl acetate), particularly in the petrol fraction of the leaves of *H. helwigii* and dichloromethane fraction of the stem bark of *M. azedarach*. No activity was shown against tested moulds.

11 **Kreft B, Dalhoff K, Sack K.**

[Necrotizing enterocolitis: a historical and current review]. [Ger]

Med Klin 2000;95(8):435-441.

Enteritis necroticans, locally called 'Darmbrand', is a severe and life threatening infectious disease which was epidemic in Northern Germany after World War II. Darmbrand had a limited appearance, occurring only for a few years. In Lubeck many cases were diagnosed in 1946/1948 and the book 'Darmbrand, Enteritis necroticans' was published in 1949 by clinicians and pathologists. Enteritis necroticans is also known as a tropical cause of bloody diarrhea and is caused by *Clostridium perfringens* type C (type beta-toxin). The disease is related to pig feasts in Papua New Guinea. Although necrotizing enterocolitis is now a rather rare disease we must be aware of the appearance of this fulminant entity. This paper represents a review on the historic and current aspects of enteritis necroticans and discusses the epidemiology, pathogenesis and treatment of this disease.

12 **Mayer DC, Kaneko O, Hudson-Taylor DE, Reid ME, Miller LH.**

Characterization of a *Plasmodium falciparum* erythrocyte-binding protein paralogous to EBA-175.

Proc Natl Acad Sci USA 2001 Apr 24;98(9):5222-5227.

A member of a *Plasmodium* receptor family for erythrocyte invasion was identified on chromosome 13 from the *Plasmodium falciparum* genome sequence of the Sanger Centre (Cambridge, U.K.). The protein (named BAEBL) has homology to EBA-175, a *P. falciparum* receptor that binds specifically to sialic acid and the peptide backbone of glycophorin A on erythrocytes. Both EBA-175 and BAEBL localize to the micronemes, organelles at the invasive ends of the parasites that contain other members of the family. Like EBA-175, the erythrocyte receptor for BAEBL is destroyed by neuraminidase and trypsin, indicating that the erythrocyte receptor is a sialoglycoprotein. Its specificity, however, differs from that of EBA-175 in that BAEBL can bind to

erythrocytes that lack glycophorin A, the receptor for EBA-175. It has reduced binding to erythrocytes with the Gerbich mutation found in another erythrocyte sialoglycoprotein (glycophorin C/D). The interest in BAEBL's reduced binding to Gerbich erythrocytes derives from the high frequency of the Gerbich phenotype in some regions of Papua New Guinea where *P. falciparum* is hyperendemic.

13 **McNab BK, Bonaccorso FJ.**

The metabolism of New Guinean pteropodid bats.

J Comp Physiol [B] 2001 Apr;171(3):201-214.

Rate of metabolism and body temperature were measured in eight species of pteropodid bats that live in Papua New Guinea. These data and those from 13 other species available in the literature are examined to determine the factors with which the energetics of pteropodids are correlated. Lowland populations of species that weigh < 35 g generally have low basal rates and often become torpid, whereas their highland populations had standard or high basal rates and were precise thermoregulators, as were all adult pteropodids that weighed more than 60 g. In large pteropodids belonging to the genera *Dobsonia* and *Pteropus*, females are smaller and consequently have lower total basal rates than males. Compared to species found on continents and large islands, species limited in distribution to small islands have lower basal rates, both because of a smaller mass and a reduction of metabolism independent of body mass. These trends are most marked in females that belong to small-island species, adjustments that may facilitate reproduction and survival on small oceanic islands with a limited resource base. Minimal thermal conductances are usually low in species that roost exposed in trees, whereas large species that roost in caves have either standard or high conductances.

14 **Michon P, Woolley I, Wood EM, Kastens W, Zimmerman PA, Adams JH.**

Duffy-null promoter heterozygosity reduces DARC expression and abrogates adhesion of the *P. vivax* ligand required for blood-stage infection.

FEBS Lett 2001 Apr 20;495(1-2):111-114.

The Duffy blood group antigen is an essential receptor for *Plasmodium vivax* entry into erythrocytes in a process mediated by the parasite ligand, the Duffy binding protein (DBP). Recently, individuals living in a malaria endemic region of Papua New Guinea were identified as heterozygous for a new allele conferring Duffy negativity, which results in 50% less Duffy antigen on their erythrocytes. We demonstrate that DBP adherence to erythrocytes is significantly reduced for erythrocytes from heterozygous individuals who carry one Duffy antigen negativity allele. These data provide evidence that emergence of this new allelic form of Duffy negativity is correlated with resistance against vivax malaria.

15 **Mueller I, Vounatsou P, Allen BJ, Smith T.**

Spatial patterns of child growth in Papua New Guinea and their relation to environment, diet,

socio-economic status and subsistence activities.
Ann Hum Biol 2001 May-Jun;28(3):263-280.

Anthropometric data from the 1982/83 Papua New Guinea (PNG) National Nutrition Survey were analysed to identify geographical patterns of child growth and investigate their relation to a wide range of environmental, dietary and socio-economic variables. Standardized growth scores for length-for-age (LAZ), weight-for-age (WAZ) and weight-for-length (WLZ) were calculated based on an internal PNG growth reference. Hierarchical Bayesian spatial models based on conditional autoregressive (CAR) priors were subsequently used to model spatial patterns in scores and their relation to different sets of covariates. The geographical differences were bigger for linear growth than for increases in weight. Growth was most reduced in parts of Milne Bay Province, Madang Province, the Torricelli/Prinz Alexander Ranges, and in the area occupied by Angan people. Socio-economic status was the most important factor determining variation in growth within populations. Differences in diet and, to a lesser extent, the physical environment were the main determining factors of differences among populations. Covariate adjustment accounted for more spatially structured variation in LAZ and WAZ than in WLZ. All variables indicating higher socio-economic status were correlated with better growth, as was a high consumption of imported and local high quality foods such as cereals, legumes, tinned fish/meat or fresh fish. This indicates that nutritional interventions in PNG should aim at promoting the consumption of such high energy and high protein foods as well as strengthening the general economic base of rural populations.

- 16 **Mulford JS, Oberli H, Tovosia S.**
Coconut palm-related injuries in the Pacific Islands.
Aust NZ J Surg 2001 Jan;71(1):32-34.

INTRODUCTION: Coconut palms are an integral part of life in the Solomon Islands, given the widespread dependence on subsistence agriculture. Injuries related to the coconut palm are thus inevitable. Hospital records from the Central Referral Hospital were reviewed to identify (i) how commonly the coconut palm is implicated in injuries referred to the surgery department; (ii) which patients are being injured; and (iii) the type of injuries sustained. **METHODS:** The present study reviews all patients referred to the Department of Surgery and Orthopaedics between January 1994 and December 1999 who had a coconut palm-related injury. This was possible due to the trauma epidemiology form, which records the patient details, cause of injury, fracture details and other injury information. **RESULTS:** A total of 3.4% of all injuries presenting to the surgical department was related to the coconut palm. 85 patients fell from the coconut palm, 16 patients had a coconut fruit fall on them, three patients had a coconut palm fall on them and one patient kicked a coconut palm. The majority of patients who were injured by falling from a coconut palm were young

(aged 6-25 years). 11 of the 16 patients struck by falling fruit were under 25 years of age. The majority of injuries sustained were fractures. Patients falling from coconut palms sustained mainly upper limb fractures (60.1% of all fractures) or spinal fractures (16.3%). Patients injured by falling fruit sustained skull or upper limb fractures. All skull fractures occurred in patients under the age of 10 years. **CONCLUSION:** This is the largest review of coconut palm-related injuries. It highlights some epidemiological facts that raise considerations for preventative health measures in the Solomon Islands. Parents and young children must be warned of the dangers of playing beneath coconut trees. Boy and girls should be warned of the dangers of collecting fruit. With an increasing amount of schooling becoming available the Solomon Islands is an ideal place to direct an education programme about the dangers of coconut palms as well as many other primary health issues. Because subsistence farming plays a crucial role in the life of most Solomon Islanders, injuries that result in loss of function are crippling both to the patient and the village. Any preventative measure to reduce the rates of injury will be important.

- 17 **Nagesha HS, Din-Syafuruddin, Casey GJ, Susanti AI, Fryauff DJ, Reeder JC, Cowman AF.**

Mutations in the *pfmdr1*, *dhfr* and *dhps* genes of *Plasmodium falciparum* are associated with in-vivo drug resistance in West Papua, Indonesia.
Trans R Soc Trop Med Hyg 2001 Jan-Feb;95(1):43-49.

This study (conducted in 1996-99) examines the association of mutations in *pfmdr1*, dihydrofolate reductase (*dhfr*) and dihydropteroate synthase (*dhps*) genes of *Plasmodium falciparum* with in-vivo drug resistance in West Papua, Indonesia. Initially, 85 patients infected with *P. falciparum* were treated with chloroquine, of whom 21 were cleared of parasites, 49 had parasitaemias classified as RI, RII or RIII resistance and 1 patient had recrudescence parasitaemia. Fansidar (pyrimethamine-sulfadoxine) was the second-line treatment and 18 patients were cleared of parasites and 31 had continuing infections classified as RI, RII or RIII resistance and 1 patient had recrudescence parasitaemia. The *pfmdr1*, *dhfr* and *dhps* genes were examined for mutations previously shown to be associated with resistance to these drugs. In this study, mutations in *pfmdr1* were associated with chloroquine resistance and mutations in both *dhfr* and *dhps* were associated with Fansidar resistance in vivo. Interestingly, Gly-437 in *dhps* along with Arg-59/Asn-108 in *dhfr* were associated with RI, RII and RIII resistance whereas Glu-540 was highly associated with only RII and RIII Fansidar resistance. This finding supports the hypothesis that the molecular basis of RI, RII and RIII Fansidar resistance involves an accumulation of mutations in both *dhfr* and *dhps*. These results suggest that mutations in both *dhfr* and *dhps* genes are a good predictor of potential Fansidar treatment failure.

18 **Nakajima I, Juzoji H, Wijarnpreecha S, Pichith K.**

The final report of the project 'AMINE', the Asia-Pacific Medical Information Network using ETS-V.

Int J Med Inf 2001 May;61(2-3):87-96.

Volunteer groups led by the Tokai University School of Medicine and the Telemedicine Society of Japan (a Non-Governmental Organization) worked from 1992 to 1996 to successfully develop a medical network spanning the Asia-Pacific region using the ETS-V Satellite. The effort was part of the Partners project, sponsored by the Ministry of Posts and Telecommunications (MPT) and the National Space Development Agency of Japan. From 25 ground stations, links to the telemedical network were installed at medical institutions at no cost. The stations included five in Papua New Guinea, five in Thailand, four in Cambodia, four in Fiji, one in China, and six in Japan. Designed exclusively for medical applications, the network was operated free of charge for users at these sites. While the 16-kHz FM-based (Frequency Modulation-based) network limited applications to the transmission of color still images and audio and packet networking, the project still achieved impressive results. The network allowed liberal and independent use of international communications, local communications, teleconferences, and teleconsultations, without requiring a hub station.

19 **Novotny V, Drozd P.**

The size distribution of conspecific populations: the peoples of New Guinea.

Proc R Soc Lond B Biol Sci 2000; 267(1446):947-952.

The size distribution of the language populations in New Guinea, which represent over 15% of the world's languages, is analyzed using models analogous to the resource division models of species abundance distribution in ecological communities. A model distribution of resource segments reflecting population size is created by repeated selection of an existing resource segment and its division into two. We found that any dependency of the selection probability on the size of the segment generated negatively skewed abundance distributions after log transformation. Asymmetric segment division further exacerbated the negative skewness. Size-independent selection produced lognormal abundance distributions, irrespective of the segment division method. Size-dependent selection and asymmetric division were deemed reasonable assumptions since large language populations are more likely to generate isolates, which develop into new populations, than small ones, and these isolates are likely to be small relative to the progenitor population. A negatively skewed distribution of the log-transformed population sizes was therefore expected. However, the observed distributions were lognormal, scale invariant for areas containing between 100 and over 1000 language populations. The dynamics of language differentiation, as reflected by the models, may therefore be unimportant relative to

the effect of variable growth rates among populations. All lognormal distributions from resource division models had a higher variance than the observed one, where half of the 1053 populations had between 350 and 3000 individuals. The possible mechanisms maintaining such a low variance around a modal population size of 1000 are discussed.

20 **Peters HR, Vince JD, Friesen H.**

Low birthweight at a Papua New Guinea highlands hospital.

J Trop Pediatr 2001 Feb;47(1):17-23.

A prospective case-control study involving 75 low birthweight (LBW) babies and 224 controls was carried out at the Mount Hagen General Hospital over a period of 7 months, from June to December 1997. Identified risk factors for LBW in this population included maternal age (age less than 22 years or over 35 years, $p = 0.03$), a birth interval of less than 2 years ($p = 0.006$), no antenatal booking ($p < 0.005$), low attendance at antenatal clinic ($p < 0.005$), fever during pregnancy ($p < 0.005$), PET ($p = 0.05$), APH ($p < 0.015$), and maternal smoking during pregnancy ($p = 0.008$). Other well-established risk factors for LBW, i.e. small stature, low body mass index (BMI), haemoglobin less than 8 g/dl, and low educational attainment, appeared to be more frequent in the mothers of the LBW babies than the controls but differences did not reach statistical significance. The results suggest the need for improved provision of, and efforts to increase the use of, antenatal and family planning services. The results also provide clear evidence of the deleterious effects of smoking during pregnancy in a developing country.

21 **Piper C, Brabin BJ, Alpers MP.**

Higher risk of post-partum hemorrhage in malarious than in non-malarious areas of Papua New Guinea.

Int J Gynaecol Obstet 2001 Jan;72(1):77-78.

22 **Polo JM.**

[The history and classification of human prion diseases]. [Sp]

Rev Neurol 2000;31(2):137-141.

INTRODUCTION AND DEVELOPMENT: The history of prion diseases is one of the most exciting chapters of the story of medicine in the twentieth century. It began in the nineteen twenties when Creutzfeldt (in one patient) and Jakob (in five patients) described a clinically polymorphic cerebral syndrome with a subacute or chronic course and fatal outcome. Although later reviews of these pioneer studies have cast doubt on the nosology of some of these cases, the eponym has been maintained over the years. It is even possible that the miliary sclerosis described by Gowers in the nineteenth century was in fact a spongiform encephalopathy. Subsequently the nosological limits of Creutzfeldt-Jakob disease remained ill-defined. This explains the large number of names given to it whilst it continued to be included in the chapter on degenerative conditions of the nervous

system. Perhaps the turning point was when, in the nineteen sixties, Carleton Gajdusek et al. showed that it was transmissible. Previously Gajdusek and Zigas had (in 1957) described the disease kuru in a group of indigenous cannibals in Papua (New Guinea). The possibility of a parallel between this kuru and the scrapie of sheep (in which transmission had been proved twenty years before) led them to experiment and eventually prove its infectious nature. Over the following years, reports of iatrogenic cases with different routes of transmission gave further proof. The absence of conventional microorganisms responsible for this group of conditions led Prusiner (in 1982) to suggest the theory of the infecting protein or prion. CONCLUSION: This theory led to better understanding of several pathological and physiopathological aspects; however, we are aware that the full story of prion diseases is still being written at the present time.

23 **Reid SA, Husein A, Partoutomo S, Copeman DB.**

The susceptibility of two species of wallaby to infection with *Trypanosoma evansi*. *Aust Vet J* 2001 Apr;79(4):285-288.

OBJECTIVE: To determine the susceptibility of the agile wallaby (*Macropus agilis*) and the dusky pademelon (*Thylogale brunil*) to infection with *Trypanosoma evansi*. METHOD: Two agile wallabies and three dusky pademelons were experimentally infected with between 5×10^4 and 10×10^4 *T. evansi* from a cryopreserved stabilate isolated from an Indonesian buffalo. Animals were observed twice daily for clinical signs and blood was collected every 3 days to determine parasitaemia. Necropsy was conducted on animals that died or were euthanised when in extremis and representative tissue sections examined. RESULTS: All wallabies developed a high parasitaemia by 6 days after infection, which persisted until death or euthanasia in extremis, between days 8 and 61. Clinical signs included anorexia, weakness and ataxia. Anaemia occurred in one wallaby that survived for 61 days. Gross pathological changes varied between animals. They included pericarditis, serous atrophy of fat, splenomegaly, ulcerative gastritis and enteritis. Histological changes were characterised by a mononuclear cell infiltration of the connective tissue of most organs with little cellular destruction. Striking lesions were seen in the choroid, heart, stomach and small intestine. CONCLUSION: Agile wallabies and pademelons are highly susceptible to infection with *T. evansi*. Wallabies, therefore, have the potential to spread *T. evansi* within New Guinea and Australia if infection is introduced. Mortality is likely to be high thereby acting as an indicator of recent introduction. Histological changes seen in wallabies infected with *T. evansi* are diagnostic for infections occurring in Australia and Papua New Guinea.

24 **Ryschkewitsch CF, Friedlaender JS, Mgone CS, Jobes DV, Agostini HT, Chima SC, Alpers MP,**

Koki G, Yanagihara R, Stoner GL.

Human polyomavirus JC variants in Papua New Guinea and Guam reflect ancient population settlement and viral evolution.

Microbes Infect 2000;2(9):987-996.

The peopling of the Pacific was a complex sequence of events that is best reconstructed by reconciling insights from various disciplines. Here we analyze the human polyomavirus JC (JCV) in Highlanders of Papua New Guinea (PNG), in Austronesian-speaking Tolai people on the island of New Britain, and in nearby non-Austronesian-speaking Baining people. We also characterize JCV from the Chamorro of Guam, a Micronesian population. All JCV strains from PNG and Guam fall within the broad Asian group previously defined in the VP1 gene as Type 2 or Type 7, but the PNG strains were distinct from both genotypes. Among the Chamorro JCV samples, 8 strains (Guam-1) were like the Type 7 strains found in Southeast Asia, while 9 strains (Guam-2) were distinct from both the mainland strains and most PNG strains. We identified three JCV variants within Papua New Guinea (PNG-1, PNG-2 and PNG-3), but none of the Southeast Asian (Type 7) strains. PNG-1 strains were present in all three populations (Highlanders and the Baining and Tolai of New Britain), but PNG-2 strains were restricted to the Highlanders. Their relative lack of DNA sequence variation suggests that they arose comparatively recently. The single PNG-3 strain, identified in an Austronesian-speaking Tolai individual, was closely related to the Chamorro variants (Guam-2), consistent with a common Austronesian ancestor. In PNG-2 variants a complex regulatory region mutation inserts a duplication into a nearby deletion, a change reminiscent of those seen in the brains of progressive multifocal leukoencephalopathy patients. This is the first instance of a complex JCV rearrangement circulating in a human population.

25 **Smales LR.**

Protospirura kaindiensis n. sp. (Spirurida: Spiruridae) and other helminths from *Pseudohydromys* (Muridae: Hydromyinae) from Papua New Guinea.

J Parasitol 2001 Feb;87(1):169-172.

One cestode and 3 species of nematodes are recorded from *Pseudohydromys murinus* and *Pseudohydromys occidentalis* (Muridae: Hydromyinae), from Papua New Guinea, for the first time. *Heterakis fieldingi* (Ascaridida: Heterakidea) has previously been known from Australia. *Odilia* sp. resembles *Odilia praeputialis* in the orientation of the synlophes and the number and size of ridges but differs in the length of spicule and lack of a praepuce. *Protospirura kaindiensis* n. sp. (Spirurida: Spiruridae) is readily distinguished from all other members of the genus by the number and arrangement of caudal papillae and the length of the spicules.

26 **Smith T, Hii JLK, Genton B, Müller I, Booth M, Gibson N, Narara A, Alpers MP.**

Associations of peak shifts in age-prevalence for

human malarials with bednet coverage.

Trans R Soc Trop Med Hyg 2001 Jan-Feb;95(1):1-6.

Effects of bednet coverage (C) on prevalence of malaria were analysed using data from 1990-1992 from 9 Papua New Guinean villages. Effects of coverage varied by age, resulting in a shift in age of peak prevalence from 4.7 (C = 0%) to 11.6 (C = 100%) years for *Plasmodium falciparum*, from 3.4 to 4.9 years for *P. vivax* and from 11.0 to 16.8 years for *P. malariae*. In small areas with no bednets the age distribution of *P. falciparum* parasitaemia was like that of a holoendemic area. Where coverage was complete the pattern corresponded to mesoendemicity. Thus, protracted use of bednets can result in profound changes in the endemicity of malaria even when coverage is incomplete and without insecticide treatment. Average entomological inoculation rates (EIRs) estimated from indoor landing rates on individuals without bednets were 35, 12 and 10 infectious bites per person per annum for *P. falciparum*, *P. vivax* and *P. malariae*, respectively. Logistic regression analyses indicated that the EIR estimate for *P. falciparum* was related to prevalence of this species independently of effects of bednet coverage. However, the recent EIR still accounted for much less variation than did the bednets. A similar pattern was seen for *P. malariae*, while there were no significant relationships between the recent EIR and the parasite positivity for *P. vivax*. It is concluded that short-term variations in inoculation rate are not important determinants of parasite prevalence in this population.

27 **Stirnadel HA, Al-Yaman F, Genton B, Alpers MP, Smith TA.**

Assessment of different sources of variation in the antibody responses to specific malaria antigens in children in Papua New Guinea.

Int J Epidemiol 2000;29(3):579-586.

BACKGROUND: A potential problem for malaria vaccine development and testing is between-host variation in antibody responses to specific malaria antigens. Previous work in adults in an area highly endemic for *Plasmodium falciparum* in Papua New Guinea found that genetic regulation partly explained heterogeneity in responsiveness. We have now assessed the relative contributions of environmental and genetic factors in total IgG responses to specific malaria antigens in children, and quantified temporal variation within individuals of total IgG responses. **METHODS:** Total IgG responses against schizont extract, merozoite surface protein-1, merozoite surface protein-2, ring-infected erythrocyte surface antigen, and SPf66 were measured by ELISA. Variance component analysis was used to estimate the variation explained by genetic and environmental factors in these antibody responses. Intra- and inter-class correlations of antibody responses within relative pairs were estimated. We adjusted for age, *P. falciparum* density, sex and village differences either within or prior to the analysis. **RESULTS:** For all malaria antigens, temporal variation in the total IgG response was

the predominant source of variation. There was substantial familial aggregation of all IgG responses, but it remained unclear how much this clustering was attributable to genetic factors and how much to a common environment in the household. The remaining variance, which could not be explained by either of the above, was very small for most of the antigens. **CONCLUSIONS:** Temporal variation and clustering of immune responses to specific malaria antigens need to be taken into account when planning, conducting and interpreting immuno-epidemiological and vaccine studies.

28 **Sugauchi F, Mizokami M, Orito E, Ohno T, Kato H, Suzuki S, Kimura Y, Ueda R, Butterworth LA, Cooksley WG.**

A novel variant genotype C of hepatitis B virus identified in isolates from Australian Aborigines: complete genome sequence and phylogenetic relatedness.

J Gen Virol 2001 Apr;82(Pt 4):883-892.

There have been no reports of DNA sequences of hepatitis B virus (HBV) strains from Australian Aborigines, although the hepatitis B surface antigen (HBsAg) was discovered among them. To investigate the characteristics of DNA sequences of HBV strains from Australian Aborigines, the complete nucleotide sequences of HBV strains were determined and subjected to molecular evolutionary analysis. Serum samples positive for HBsAg were collected from five Australian Aborigines. Phylogenetic analysis of the five complete nucleotide sequences compared with DNA sequences of 54 global HBV isolates from international databases revealed that three of the five were classified into genotype D and were most closely related in terms of evolutionary distance to a strain isolated from a healthy blood donor in Papua New Guinea. Two of the five were classified into a novel variant genotype C, which has not been reported previously, and were closely related to a strain isolated from Polynesians, particularly in the X and Core genes. These two strains of variant genotype C differed from known genotype C strains by 5.9-7.4% over the complete nucleotide sequence and 4.0-5.6% in the small-S gene, and had residues Arg(122), Thr(127) and Lys(160), characteristic of serotype ayw3, which have not been reported previously in genotype C. In conclusion, this is the first report of the characteristics of complete nucleotide sequences of HBV from Australian Aborigines. These results contribute to the investigation of the worldwide spread of HBV, the relationship between serotype and genotype and the ancient common origin of Australian Aborigines.

29 **Underhill PA, Passarino G, Lin AA, Marzuki S, Oefner PJ, Cavalli-Sforza LL, Chambers GK.**

Maori origins, Y-chromosome haplotypes and implications for human history in the Pacific.

Hum Mutat 2001 Apr;17(4):271-280.

An assessment of 28 pertinent binary genetic markers on the non-recombining portion of the Y chromosome (NRY) in New Zealand Maori and other relevant populations has revealed a diverse

- genetic paternal heritage of extant Maori. A maximum parsimony phylogeny was constructed in which 9 of the 25 possible binary haplotypes were observed. Although approximately 40% of the samples have haplotypes of unequivocal European origin, an equivalent number of samples have a single binary haplotype that is also observed in Indonesia and New Guinea, indicative of common indigenous Melanesian ancestry. The balance of the lineages has either typical East Asian signatures or alternative compositions consistent with their affinity to Melanesia or New Guinea. Molecular analysis of mtDNA variation confirms the presence of a single predominant characteristic Southeast Asian (9-bp deletion in the Region V) lineage. The Y-chromosome results support a pattern of complex interrelationships between Southeast Asia, Melanesia and Polynesia, in contrast to mtDNA and linguistic data, which uphold a rapid and homogeneous Austronesian expansion. The Y-chromosome data highlight a distinctive gender-modulated pattern of differential gene flow in the history of Polynesia.
- 30 **Ulijaszek SJ.** Secular trend in birthweight among the Purari delta population, Papua New Guinea. *Ann Hum Biol* 2001 May-Jun;28(3):246-255.
The aim of this analysis was to examine the extent and possible seasonal nature of the secular trend in mean birthweight in the Purari delta, Papua New Guinea. This is a country undergoing rapid modernization, and with this has come a secular trend toward increased adult body size in some parts of the country but not others. Birthweight data, collected by month of delivery at Kapuna Hospital in the Purari delta between the years 1969 and 1996, were analysed by year of birth and by season, using one-way analysis of variance and post hoc Scheffe tests with the statistical software SPSS-PC+. A total of 927 birthweights for the years 1969, 1972, 1977, 1994 and 1996 were included in the analysis. Twin births were excluded from analysis, as were births below 1.5 kg. There is clear evidence of a secular trend in increasing mean birthweight between the period 1969 and 1996, with the largest significant difference being between 1977 and 1994, from 2.70 to 2.92 kg. There were no significant differences in mean birthweight between the sexes. The rate of birthweight increase between 1977 and 1994 was 130 g per decade, lower than the gain of 200 g per decade in the period 1994-1996. The decline in birthweight of 90 g per decade during the period 1969-1977 is not statistically significant. The proportion of infants born with low birthweight (< 2.5 kg) shows an increase between 1969 and 1972, and a decline thereafter. While seasonal differences in birthweight during any of the years examined is non-significant, significantly greater mean birthweight across the period 1969-1996 was found for births during the wet season (April to July), and the drier season (August to November), respectively. The secular increase in mean birthweight is likely to be a consequence of the improvements in maternal diet and increased maternal body size that have come with economic modernization. The secular trend of seasonality in mean birthweight among the Purari delta population may be a function of seasonally varied displacement of traditional diet by non-local bought foods, as well as reduced seasonality of maternal workload associated with the processing of the traditional staple food.
- 31 **Watters DA, Kapitgau WM, Kaminiel P, Liko O, Kevau I, Ollapallil J, Ponifasio P.** Surgical capability and surgical pathology in Papua New Guinea in the year 2000. *Aust NZ J Surg* 2001 May;71(5):274-280.
BACKGROUND: Papua New Guinea (PNG) is a country of 4.5 million people with an annual health budget of only 96 million Kina (1K = US\$0.35). There are 19 hospitals in the country and national surgeons are now staffing most of these hospitals. This review aims to describe the surgical pathology in the year 2000 and the capability of PNG surgeons to manage it. METHODS: A review of publications, reports and surgical audit data on surgery in PNG was conducted. Surgical audit has been computerized for over 5 years. The review also draws on personal experience and data from MMed theses submitted to the University of Papua New Guinea. RESULTS: *Surgical pathology.* Surgical practice in PNG remains very general. Late presentation and advanced disease are common. Trauma, infection, malignancy and congenital anomalies dominate the surgical scene. The pattern of disease is different from what is found in the West. Western diseases are emerging with the incidence of appendicectomy rising from 5/100,000 to 75/100,000 in the past 30 years. The incidence of diabetes and gallstones has also risen. Osteoporosis, Colles' and neck of femur fractures are rare. *Surgical capability.* The standard of surgical care is acceptable with a low wound infection rate for clean and clean-contaminated abdominal surgery of 0.9% and an anastomotic leak rate of 1.6%. Transurethral prostatectomy is also being performed to a satisfactory standard. For head injuries admitted with a Glasgow Coma Score of 6-8 a good outcome is achieved in over 70% of cases. Hospital mortality for surgical admissions is 3.7%. Subspecialties in orthopaedics, urology and head and neck surgery have been established. Neurosurgery, paediatric and cardiac surgery are being developed. *Priorities for the next decade.* Papua New Guinea needs to continue to develop surgical subspecialties, particularly paediatric and neurosurgery, while maintaining a broad competence in general surgery. Services for burns, spinal injuries, rehabilitation and oncology need to be improved. Surgeons need to be more involved in rural health and teaching basic skills to primary health-care workers. Acquisition, maintenance and repair of surgical equipment needs to be improved so that PNG's well-trained surgeons can have the right tools for their trade. CONCLUSIONS: Papua New Guinea offers a wide range of surgical pathology. The standard of surgery in PNG is reasonable but there are many areas that need

development during the period of the next national health plan, 2001-2010. Australasian surgery has many opportunities to assist surgeons in PNG to achieve their objectives.

32 **Yamauchi T, Umezaki M, Ohtsuka R.**

Influence of urbanisation on physical activity and dietary changes in Huli-speaking population: a comparative study of village dwellers and migrants in urban settlements.

Br J Nutr 2001 Jan;85(1):65-73.

The influence of urbanisation on physical activity and dietary changes was examined in a Papua New Guinea Highland population. Adult male and female subjects (n=56) were selected, including twenty-seven rural villagers and twenty-nine urban migrants. BMR was calculated from values measured in similar samples of Huli-speaking population, according to gender and body weight. Total daily energy expenditure (TEE) was assessed by 24 h heart rate (HR) monitoring (flex-HR method) and physical activity level (PAL) calculation was based on BMR. Energy, protein and fat intakes were measured by weighing food on a single day. Urban subjects were heavier and taller than their rural counterparts; significant differences were found in stature in men ($p < 0.05$) and body weight in women ($p < 0.05$). Urban subjects had longer sedentary periods ($HR \leq \text{flex-HR}$) and shorter active periods ($HR > \text{flex-HR}$) than rural subjects. Consequently, the former had lower TEE and PAL than the latter; significant differences were found in women (TEE, $p < 0.05$, PAL, $p < 0.01$) but not in men. Total daily energy intake and TEE were well balanced ($< 7\%$) in all groups, whereas protein and fat intakes were considerably higher in urban subjects than rural subjects. Reduced PAL and increased fat intake by urban dwellers may increase the risks of obesity and chronic degenerative diseases.

33 **Yamauchi T, Umezaki M, Ohtsuka R.**

Physical activity and subsistence pattern of the Huli, a Papua New Guinea Highland population.

Am J Phys Anthropol 2001 Mar;114(3):258-268.

Several studies on human energetics have been conducted in developed and developing countries, but very few simultaneously measured time use and energy expenditure. Only a few quantitatively compared subsistence patterns between rural and urban dwellers of an identical population. Here we present the daily physical activity level (PAL), physical exertion, time, and energy expenditure in contrasting subsistence/occupational activities of Papua New Guinea Highlanders, comparing 27 rural villagers (15 men, 12 women) who maintained traditional subsistence agriculture with 29 urban migrants (14 men, 15 women) who engaged in cash-earning work. A large sex inequality in the division of labor was noted between rural males and females, but not among urban dwellers. Rural-urban comparison indicated sex differences in urbanization. For urban men, the reduction of physical exertion level during work, from energy-consuming agricultural work to sedentary cash-earning work, together with significantly extended work time (by 261 min/day, $p < 0.001$), led to an increase in work energy expenditure (15-29% of PAL). In contrast, urban women who spent almost equal time at work relative to rural women showed a lower energy expenditure (18% compared to 26% of PAL). The associations with urbanization included a gain in body weight (by 6.4 kg for either sex) and reduced PAL (by 7%, not significant in men; 13%, $p < 0.01$ in women). Further research is needed to elucidate the effects of urbanization on time use, energy expenditure and PAL, by comparing rural residents with urban migrants in the same population.

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