RESETTLEMENT OF RIVER VALLEYS FREED FROM ONCHOCERCIASIS AFTER TEN YEARS OF VECTOR CONTROL IN UPPER VOLTA

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In Upper Volta there was a sharp contrast between the over-populated plateau and the empty valleys in which about 80,000 km^2 were uncultivated and uninhabited. Onchocerciasis was the main obstacle to farmers resettling, even if it was not the only reason for land desertion. The possibility of communities surviving in onchocerciasis areas depends on the population density (over 50 h. per km^2) and on agricultural practices.

In 1975, blackfly control was extended to all the river systems in Upper Volta by the Onchocerciasis Control Programme. All the valleys became free of the blackfly pest and of onchocerciasis transmission. A survey was carried out to compare land occupation before the control campaign and at the end of 1983. The data from aerial scanning were confirmed by inquiries in villages.

Since 1975, more than 15% of the uncultivated lands have been resettled in the valleys of the White Volta, Red Volta, and Black Volta. In certain areas, all the available land is now cultivated, e.g., the Yeriba area of the White Volta river basin. Along the White Volta more than 1,500 km^2 have been conquered, and an additional 900 km^2 along the Red Volta. In these areas there is strong demographic pressure from the population in the plateau where the land is over-cultivated.

South of the 11° north parallel, resettlement progressed more slowly. Only 11% or less of the available land has been reoccupied. However, resettlement, of various degrees, is taking place in all the valleys.

Moreover, cattle breeders are now migrating into the valleys in quite large numbers, generally settling around the farms.

The process of colonization of the lands freed from onchocerciasis has started everywhere in Upper Volta and has been accelerating since 1979.

MARK-RELEASE-RECAPTURE STUDIES ON INDOOR-RESTING, BITING AND DISPERSAL BEHAVIOUR OF AN. BALABACENSIS IN SABAH, MALAYSIA

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Mark-release-recapture experiments were carried out in Sabah on the malaria and filariasis vector, Anopheles balabacensis. Samples of wild females were marked with different colours of fluorescent pigments, released in man-baited huts fitted with exit traps. Simultaneous collections and releases were also made in night-biting catches on a water buffalo and four men. All subsequent recaptures were made in the same situation in which the mosquitoes were marked. The same individual mosquitoes were caught biting man and buffalo on different occasions and the numbers caught showed a strong preference for man over buffalo. The length of the oviposition cycle in the field was found to be 3.0 days. After blood-feeding on man in a hut, An. balabacensis were found to exit on the same night or early morning. The same individual mosquitoes were found resting in the hut or exit trap on different occasions. The results indicate that there is strong evidence for the existence of genetic variability in the tendency of An. balabacensis to rest in houses and to bite man and buffalo. The obvious existence of this phenomenon is considered discouraging for the prospects of interruption of malaria transmitted by An. balabacensis in nature.

IMMUNITY IN EXPERIMENTAL CUTANEOUS LEISHMANIASIS: AN ACQUIRED ABILITY OF THE HOST TO KILL PARASITES AT THE SITE OF INFECTION

Joseph O. Hill

Studies of experimental cutaneous leishmanisis in the mouse have added significantly to our understanding of this human parasitic disease. To date, however, all studies have relied almost exclusively on measuring changes in the size of the lesion that develops at the site of inoculation of the parasite. With the recent application, in this laboratory, of an agar based media to the quantitation of the parasite, more interpretable data on the changes in the number and distribution of viable parasites in the host can be obtained. Studies of Leishmania tropica infection in 5 resistant mouse strains revealed that the parasites multiply in the developing lesion for only 2-3 weeks, with no evidence of dissemination beyond the local lymph node. Associated with the cessation of growth and subsequent decline in the number of viable parasites in the lesion was the development and expression systemically of acquired resistance to reinfection. The resistance was T cell-mediated, and passively transferrable. The immunity that develops in the resistant strains, however, does not result in the complete elimination of the parasites from the infected footpad. From 10^3-10^5 viable parasites persist in the healed lesion, concomitant with a stable state of acquired resistance, for at least one year. In BALB/c mice and most BALB/c F_1 Hybrids, the parasite multiplies progressively in the footpad and rapidly disseminates to the liver and spleen. At no time during the infection in BALB/c mice did immunity develop to a level capable of altering, even temporarily, the growth of primary infection, or capable of protecting the animal against a challenge infection. However, if mice were thymectomized, lethally irradiated, and reconstituted with bone marrow prior to infection, the course of the infection was similar in all mouse strains. Therefore, when compared to the same infection in immunocompetent control, the TXB-BALB/c mice were more resistant. TXB-AB6 F_1 mice showed little difference from controls, whereas T cell-depleted C3H/He mice were actually more susceptible to the infection. In addition, it was found that sublethal irradiation is protective in resistant as well as susceptible mouse strains. These data are consistant with the current hypothesis that all mouse strains are populated with percursors of specific effector and suppressor T cells, and the balance between these lymphocyte populations that exists before the animal is infected determines the outcome of the disease.

A CONTROLLED TRIAL OF HIGH-SODIUM ORAL ELECTROLYTE SOLUTION IN WELL-NOURISHED U.S OUTPATIENTS

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The efficacy of high-sodium oral rehydration solution in the treatment of diarrheal dehydration has been well-established overseas. This study was designed to test the safety and efficacy of the World Health Organization high-Na ORS (WHO-ORS) in the management of well-nourished outpatients with diarrheal disease in the U.S., with particular emphasis on its use as a maintenance solution in non-dehydrated patients.

Sixty-eight patients, 2-36 mos. old, with diarrhea of ≥5 stools per day for 12 hrs-7 days, were randomly assigned to receive either WHO-ORS (Na^+90, K^+20, Cl^-80, HCO_3^-30, Glu 110 mmol/l). or Pedialyte^R (Na^+30, K^+20, Cl^-30, Base 20, Glu 280 mmol/l). They were given 150 ml/kg of solution, to be given at home over 24 hours. Serum electrolytes were measured initially and at the 24-hr. return visit. There were no significant differences in the two groups in number (34 each), age (mean 11.1 mos.), weight (9.0 kg.), duration of diarrhea prior to treatment (2.9 days) or number dehydrated (10 WHO vs. 12 Pedialyte). At the return visit there was no difference in weight gained (mean 58 gm.), amount of solution drunk (140 ml/kg), or duration of diarrhea (30 hrs). No patients on high-Na ORS became hypernatremic. One patient in the WHO group was hypernatremic initially (Na 150) and had Na 149 at 24 hrs. In the Pedialyte group, two patients developed hyponatremia (Na ≤132). Eleven patients still appeared dehydrated at follow-up (4 WHO vs. 7 Pedialyte), and 3 were referred for IV hydration. One patient on Pedialyte was admitted during a relapse. Five patients in the WHO group displayed mild periorbital edema, all with normal serum sodium. An etiology was found in 22% of cases (8 Rotavirus, 6 Salmonella, 1 Shigella) evenly distributed between the two groups.

We conclude high-Na ORS is safe and effective as a therapeutic and maintenance solution in well-nourished U.S. children.

GENETIC IDENTIFICATION OF SIBLING SPECIES IN THE ANOPHELES BALABACENSIS COMPLEX

J. L. K. Hii

Polytene chromosome characteristics and cross-breeding data confirm that An.dirus is a separate species within the Anopheles balabacensis complex of malaria vectors in southeast Asia. Furthermore the typical Thailand strain of An.dirus is distinct from the Perlis strain (north Malaya) and these are provisionally regarded as species A and B of An.dirus.

Studies included progeny from wild An. balabacensis collected in Sabah, Malaysia, which were shown to be reproductively distinct from both species of An.dirus sensu lato. Hybrid males from crosses between An.balabacensis and An.dirus species A were sterile, as were those between female species B x male species A of An.dirus. Chromosomal studies also showed that reproductive isolation was accompanied by contrasted expression of the banding pattern on polytene chromosomes of the three sibling species, affecting autosomes as well as X-chromosomes, with extensive regions of asynapsis occurring between homologous homosequential chromosomes in larval salivary gland preparations.

These data help to resolve the difficulties of interpreting the relative identity and status of species comprising the An.balabacensis complex, and provide a basis on which to compare their importance as vectors and geographical distributions.

DETECTION OF ENTEROTOXIGENIC ESCHERICHIA COLI IN FOODS BY DNA COLONY HYBRIDIZAT

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The recovery of certain bacterial species from foods is difficult because of differences between the physical and chemical characteristics of food products as well as the great heterogeneity of the indigenous microflora. Specialized enrichment procedures have been devised. Often the enrichments are physiologically demanding and not all strains of a given bacterial species may be recovered equally. During selective enrichment poor survival of some pathogenic strains of Escherichia coli and the loss of plasmids coding for determinants of virulence revealed the need for alternative methods.

DNA colony hybridization is well suited for the testing of large numbers of bacterial isolates for the presence of particular genes even, those associated with virulence. We have used a radioactively labeled restriction endonuclease fragment of the heat-labile enterotoxin gene of E. coli as a probe to detect those isolates of this bacterium that possess the genetic information for producing the toxin. As few as ten enterotoxigenic E. coli (ETEC) cells can be detected against a background of over one million non-producing cells. When ten different types of foods were seeded with ETEC, at least fifty percent of the cells could be detected as spots on autoradiograms. Food type had little effect on the efficiency of enumeration of ETEC. Similar results were obtained with plate count, eosin methylene blue, MacConkey, and endo agars.

To determine if the DNA colony hybridization method was reproducible, twenty-five unknown samples were sent to each of thirteen laboratories. Of the 325 samples tested, 315 (96.7 %) were identified correctly. Chi-square values indicated that the method was equally efficient in distinguishing between positive and negative samples (95.7 and 98.1 %, respectively). This degree of interlaboratory agreement makes DNA colony hybridization suitable for use in the routine screening of foods for pathogenic bacteria.

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ABSTRACT AND POSTER VOLUME

XI INTERNATIONAL CONGRESS

for

TROPICAL MEDICINE & MALARIA

CALGARY, CANADA
SEPTEMBER 16 - 22, 1984