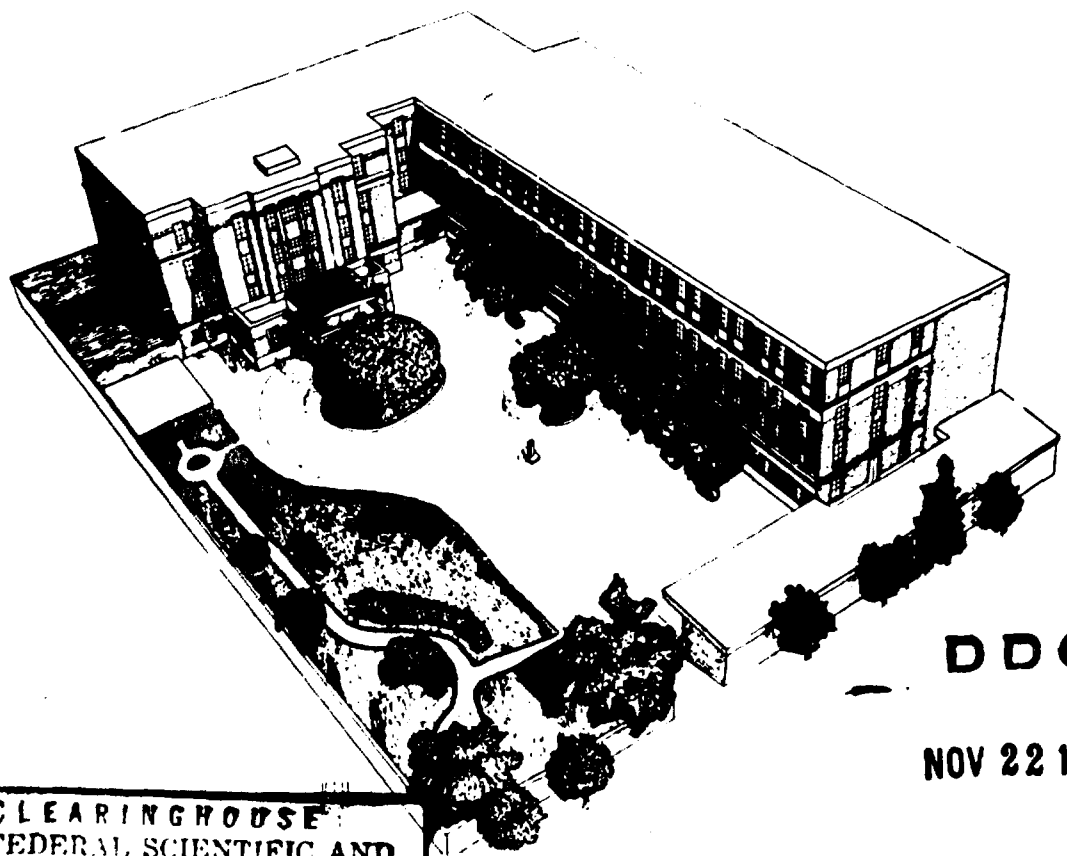


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# NAMRU-2

Summaries of Research  
1 January - 30 June 1965



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Summaries of Research  
1 January - 30 June 1965

These summaries cover the research reported upon during the first six months of 1965.

The work was supported in part by Research and Development funds and in part by funding under Public Law 480, Section 104(c).  
Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

R. A. PHILLIPS  
CAPT MC USN  
Commanding Officer

MR005.09-1040.1.16

Water and electrolyte absorption by the intestine in cholera

Phillips, R. A., Wallace, C. K., and Blackwell, R. Q.

1. The cholera patient's ability to absorb orally administered water and the  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ , and  $\text{HCO}_3^-$  ions was determined in 12 subjects. In some of the patients, the studies were repeated in convalescence.

2. Studies on these typical patients are discussed in sufficient detail to show that  $\text{H}_2\text{O}$  and the  $\text{K}^+$  and  $\text{HCO}_3^-$  ions are readily absorbed while  $\text{NaCl}$  given orally is not absorbed in acute, severe cholera; net absorption of these ions is readily shown in convalescence.

(Proceedings of the Symposium on Cholera Research, Honolulu, Hawaii, 24-29 Jan, 1965. In press)

MR005.09-1040.1.23

The effect of glucose on cation transport

Love, A. H. G.

The addition of actively transported sugars to the solution bathing the mucosal surface of an in vivo loop preparation of rabbit ileum causes an increase in the rate of absorption of sodium from the intestinal lumen. This net increase in sodium transport is the result of an increased flux of sodium ions from lumen to plasma while the flux of these ions from plasma to lumen is unchanged. These effects are dependent upon active transport of the sugar and not on any metabolic contribution of the transported sugar. In cholera infected loops net accumulation of sodium in the intestinal lumen is accounted for by increased flux of sodium ions from plasma to lumen without any evidence of lumen to plasma flux depression. The addition of glucose to the mucosal fluid in these infected loops is capable of stimulating the movement of sodium ions from lumen to plasma. Enhancement of sodium absorption from the intestinal tract by the addition of glucose has been demonstrated in human cholera patients. (Proceedings of the Symposium on Cholera Research, Honolulu, Hawaii, 24-29 Jan, 1965. In Press)

MR005.09-1040.1.24

Electrolyte fluxes in the isolated ileal loop

Mitchell, T.G.

A technique is described for study of unidirectional transfer rate of electrolytes using radioisotopes of differing half-lives. Ileal loops were inoculated with cholera vibrio and allowed to incubate for 4 to 20 hours. Transfer rates for lumen to plasma and plasma to lumen flux were determined in control and in infected loops.

Diminution of sodium transfer from lumen to plasma in the infected rabbit ileal loop could not be demonstrated without a concomitant decrease in the lumen to plasma flux of potassium ion.

(Proceedings of the Symposium on Cholera Research, Honolulu, Hawaii, 24-29 Jan. 1965. in press)

MR005.09-1040.1.25

Chemical studies of stools. A comparison of normal stools, cholera stools, other diarrheal stools and artificially induced diarrheal stools.

Fresh, J.W.

The chemistry of cholera stools is compared with those of other diarrheas, artificially induced liquid stools and normal formed stools. The sodium concentration tends to decrease and the potassium concentration tends to increase as the stool volume decreases.

Although iron is not regarded as an electrolyte and is not considered freely diffusable through the bowel mucosa, it too is present in the stools of NPO cholera patients in appreciable quantities. This likely represents mucosal cells that are dissociated earlier and more frequently from the mucosa in Cholera.

(Proceedings of the Symposium on Cholera Research, Honolulu, Hawaii, 24-29 Jan. 1965. In press)

MR005.09-1040.1.27

Sodium flux and water transport in the everted rabbit intestinal sac

Neptune, E. M., Jr., and Mitchell, T.G.

The everted intestinal sac prepared from adult rabbit ileum has unidirectional fluxes of sodium that can be measured with  $\text{Na}^{22}$  and  $\text{Na}^{24}$ . The rates are linear for one hour. The net flux is from mucosa to serosa and the net values are about ten per cent of unidirectional fluxes (net, approximately  $1 \mu\text{Eq}/\text{cm}^2/\text{hr}$  at  $37^\circ$ , pH 8.0, in Ringer phosphate-bicarbonate). In the same experiments, there is also net transport of water from mucosa to serosa. The sacs consume glucose, but glucose does not stimulate sodium or water transport. Raising the initial potassium concentration of 5 mEq/L to 20 mEq/L increases glucose consumption but does not alter sodium and water transport. The net transport of sodium is inhibited by KCN and  $\text{HgCl}_2$  and the unidirectional fluxes are decreased but not abolished.

(Submitted to Amer. J. Physiol.)

Lecture and Review Report No. 64-1  
Pathophysiology of cholera

Phillips, R. A.

Studies of cholera prior to 1964 postulated and apparently proved that in severe cholera there was a normal or increased flux of isotonic solution from plasma to gut lumen and that because of inhibition of active sodium transport by cholera products a voluminous dejecta developed which was responsible for death in the untreated case. These studies were based in part on animal models.

Studies in the past few months have questioned the reliability of the animal models and it is essential that definitive studies which will require the use of isotopes to determine bidirectional flux of Na ions be conducted on patients with severe classical cholera.

On the basis of these studies, it is to be hoped that animal models can be developed which will forward the understanding of the pathophysiology in cholera.  
(Proceedings of the Symposium on Cholera Research, Honolulu, Hawaii, 24-29 Jan. 1965. In press)

USNRDL-TR-859

MR005.08-1200.1

Changes in total body sodium, and body water during acute cholera and during maintenance therapy

Vaughan, B. E., Martin, R. L., Wallace, C. K.,  
Blackwell, R. Q., Reyes, A. L., and Phillips, R. A.

Tracer studies of fluid compartment changes were made possible during the 1961 cholera outbreak in Manila, Philippine Islands. TBW,  $\text{Na}_e$ , ECF and intracellular fluid shifts were measured during rehydration therapy and during controlled periods of diarrheal dehydration. When fecal, urine, and estimated insensible losses are replaced by equivalent volumes of isotonic NaCl at a plasma specific gravity of 1.024, some degree of sodium loading occurs. For otherwise normal patients, this would lie within reasonable range of renal compensation. At high fecal outputs, the tracer sodium initially excreted into the gut appears not to be reabsorbed, and it is delayed several hours in appearing in stool. Cholera dehydration causes marked depletion of extracellular water with comparatively small losses from intracellular water.  
(USNRDL-NAMRU-2 collaborative study)

NMRI Research Report

MR005.09-1100.01

Relative contributions of active transport and diffusion to cation losses in cholera.

Huber, G. S., Blackwell, R. Q., and Wallace, C. K.

A set of algebraic equations, derived on the basis of a two compartment model, was employed in an attempt to evaluate the relative contributions of permeability and active transport

to the cation losses seen in choleraic stools. Some of the conclusions arrived at utilizing these equations were as follows: Partial damage to the intestinal active sodium transport mechanism was chiefly responsible for the diarrheal cation losses in severe cholera. Active potassium transport need not be invoked to explain these losses. Passive permeability of the intestine, as judged by the diffusivities of sodium and potassium ions, while increasing with disease duration, appears to play a minor role in the diarrheal cation losses. (Proceedings of the Symposium on Cholera Research, Honolulu, Hawaii, 24-29 Jan, 1965. In press) (NMRI-NAMRU-2 collaborative study)

MR005.09-1201.4.8

Mycoplasma pneumoniae (Eaton PPLO) respiratory disease among American military personnel on Taiwan, Republic of China

Picken, J. J., and Jenkin, H. M.

A brief review of the salient facts about Mycoplasma pneumoniae (Eaton PPLO) respiratory infection is presented.

M. pneumoniae (PPLO) lower respiratory disease is described from an outbreak among American military personnel and dependents on Taiwan. Of 21 patients 13 were found to have pneumonitis. Clinical features of those cases with pneumonia were indistinguishable from other atypical pneumonias. M. pneumoniae was isolated from 1 of 21 throat swabs. Serologic evidence of this organism as the etiologic agent in these respiratory infections was shown in 13 of 15 paired sera tested using a microtiter complement-fixation test.

A significant level of CF antibodies appeared within ten days after onset of illness and persisted throughout the 93 day period of observation.

It is the purpose of this report to alert the medical practitioner on Taiwan to the presence of M. pneumoniae and to the nature of the illness produced by this organism. (Jr. Formosan Med. Ass., 64:1, 1965)

Lecture and Review Report No. 65-1

The non bacterial etiology of acute lower respiratory tract disease in children - A review

Alexander, E. R.

The non bacterial causes of lower respiratory tract disease in children have been reviewed. If all the latest techniques were available in one laboratory, about two thirds of lower respiratory tract infections in children could be identified. The most important single agent is respiratory syncytial virus. Adenoviruses, influenza and parainfluenza together cause about the same number of illness as respiratory syncytial virus, but the illnesses are generally milder. Mycoplasma pneumoniae accounts for a significant proportion of disease in children over five years of age.

Only for influenza is a vaccine available and this is limited by short duration of protection and moderately severe side reactions, although oil adjuvant influenza vaccine is more promising. For the rest, vaccines or antiviral agent would be welcome, and it is most needed for respiratory syncytial virus. Experimental vaccines for all these agents have been attempted, but for a variety of reasons, are not yet satisfactory. In contrast to the causes of upper respiratory infections in childhood, the causes of lower respiratory tract disease are less complex and if safe and effective preventive or curative agents can be developed there is ample justification for their use.

(Acta Paediat. Sinica, In press)

MR005.09-1601.3.29

Hemiurid trematodes of Formosan marine fishes. I. Subfamilies Dinurinae and Stomachicolinae

Reid, W. A., Coil, W. H., and Kuntz, R. E.

Several specimens of hemiurid trematodes belonging to two subfamilies, Dinurinae and Stomachicolinae, are represented in a collection of helminths of Formosan vertebrates. The hosts are marine fishes. Erilepturus formosae sp. n. (from Alectis indica) and Lecithocladium bulboclabrum sp. n. (from Rastralliger

kanagurta) are described and discussed. Stomachicola muraenesocis Yamaguti, 1934 is reported again from the type host, Muraenesox cinereus. Keys to the species of Erilepturus and Lecithocladium are proposed.

MR005.09-1601.3.30

Hemiurid trematodes of Formosan marine fishes. II. Subfamily Lecithochiriinae

Reid, W. A., Coil, W. H., and Kuntz, R. E.

Several specimens of hemiurid trematodes belonging to the subfamily Lecithochiriinae are represented in a collection of helminths of Formosan vertebrates. The hosts are marine fishes. Sterrhurus concavovesiculus sp. n. is described from Gymnothorax melanospilus (type host) and G. kidako. Lecithochirium microstomum Chandler, 1935 is reported for the first time from the Asian Pacific, from Saurus sp. Separogermiductus magnus (Yamaguti, 1938) Skrjabin and Guschanskaja, 1955 is also reported from Saurus sp., as well as from Saurida filamentosa, and the taxonomic status of this species is verified. A new genus, Magniscyphus, is proposed for Sterrhurus taboganus Sogandares-Bernal, 1959. Keys to the species of Sterrhurus, Lecithochirium, and Separogermiductus are proposed.

MR005.09-1601.7.12

Abnormal hemoglobin characteristics of Taiwan Aborigines

Blackwell, R. Q., Huang, J. T. H., and Chien, L. C.

Members of eight of the aboriginal tribes of Taiwan have been examined for abnormal hemoglobins by vertical starch gel electrophoresis. The names of the tribes and the numbers tested among the 4501 subjects are: Ami 1571; Atayal 354; Bunun 684; Paiwan 941; Puyuma 329; Rukai 129; Saisiat 184; and Tsou 309. Abnormal hemoglobins were found only in the Ami tribe where 9 among the 1571 had hemoglobin G; all of the members of the other seven tribes appeared normal. Pending structure studies the G hemoglobin has been named G<sup>Taiwan: Ami</sup>

It is considered of particular anthropological interest that no cases of hemoglobin E were detected in this relatively large sample of Taiwan aborigines who, because of their physical appearance, languages and cultural characteristics, are considered to be of Proto-Malayan stock. Almost without exception hemoglobin E has been found among every other South East Asian group tested. Its apparent absence from the Taiwan aborigines suggests that the hemoglobin E gene may have entered some of the groups in relatively recent times.

(Human Biology. In press)

MR005.09-1601.7.13

Preliminary report on abnormal hemoglobins in Filipinos

Blackwell, R. Q., de la Fuente, V., Florentino, R. F.,  
Alejo, L. G., Huang, J. T. H., and Chien, L. C.

In a preliminary survey 2563 presumably healthy normal Filipinos were examined for abnormal hemoglobins. Among 1709 blood samples collected from subjects in Luzon, 10 or 0.6 per cent, were found to have hemoglobins A+E and one was found to have hemoglobins A+G. Twelve among 854 subjects, 1.4 per cent, from the Western Visayas region of the country also had A+E hemoglobins. However, the 854 subjects were not randomly chosen and came from 191 family groups. Four of the 191 family groups, 2.1 per cent, included individuals with A+E hemoglobins.

These results suggest that the incidence of individuals with A+E hemoglobins may be higher in the Western Visayas region than in some other regions of the country. Further studies are in progress to investigate the possibility of such regional variations.  
(Jr. Philippine Med. Ass. In press)

MR005.09-1606.1.2

Mosquitoes of Taiwan: Genus Toxorhynchites Theobald

Lien, J. C.

The adult, pupal, and 4th instar larval stages of T. aurifluus and T. manicatus of Taiwan are described in detail. A key and some aspects of their bionomics are also given.

(J. Med. Ent., 2:1, 1965)

MR005.09-2001.2.1

Chemotherapy with Bithionol-S-oxide in animals infected with Paragonimus westermani

Kim, D.C., Sun, S.C., and Bergner, J.F., Jr.

Bithionol-S-oxide (Bitin-S) was found to be effective against paragonimiasis in animals infected with Paragonimus westermani. Bitin-S 100 mg/kg body weight was administered every other day or daily for varying periods to cats, dogs and a monkey infected with P. westermani.

Efficacy of the agent against paragonimiasis varied depending on host species and on the magnitude of the infection. Paragonimus infection in cats required more prolonged doses than in dogs or monkey; and the heavy-infected animals needed more prolonged treatment than those in light-infected animals.

Cats and monkey tolerated the agent 100 mg/kg administered every other day for 10 to 12 times and even to the additional 50 mg/kg administered daily for 35 times in cats. Dogs were very sensitive to the agent with the doses 100 mg/kg every other day or 50 mg/kg daily administration, showing vomiting, diarrhea, loss of appetite, and loss of body weight. However, no toxic manifestations were found in histo-pathological studies with the above used doses.

(National Institute of Health Report, Republic of Korea, 1:153, 1964)

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The following reports are referred to only by title. Complete copies of any of these reports will be provided on request.

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- |                                     |   |
|-------------------------------------|---|
| MR005.09-1040.1.20<br>Research Note | Transport of sodium and water by rabbit ileum in vitro and in vivo --<br>Love, A.H.G., et al<br>(NATURE 206:4989, 12 June 1965) |
| MR005.09-1040.1.21<br>Research Note | Cathartics and the sodium pump --<br>Phillips, R.A., et al<br>(NATURE 206:1367, 26 June 1965)                                   |



Papers presented at the Symposium on Cholera Research,  
Honolulu, Hawaii, 24-29 January 1965.

- Mitchell, T.G.                      Electrolyte fluxes in the isolated ileal loop.
- Fresh, J.W.                        Chemical studies of stools: A comparison of normal stools, cholera stools, other diarrheal stools and artificially induced diarrheal stools.
- Neptune, E.M., Jr. and Mitchell, T.G.                      Ammonium toxicity: A potential artifact in preparation of toxins.
- Phillips, R.A.                      Pathophysiology of cholera.
- Phillips, R.A., Wallace, C.K., and Blackwell, R.Q.                      Water and electrolyte absorption by the intestine in cholera.
- Love, A.H.G.                        The effect of glucose on cation transport.

Papers presented before the 12th Regional Medical Conference of the Taiwan Medical Association, Tainan, Taiwan, Republic of China, 1-2 May 1965.

- Fresh, J.W.                        Thyroid function in normal Chinese people on Taiwan, as measured by the protein bound isotonic test.
- Sultor, E.C. Jr., and Cranford, R.S.                      The effect of Agarose and DEAE dextran on plaque characteristics of selected arboviruses in chick embryo fibroblast cells.
- Sultor, E.C. Jr., and Liu, H.H.                      Adaptation of Grace's continuous lines of moth and mosquito cells to heterologous hemolymphs.
- Sultor, E.C. Jr., and Chang, L.L.                      Intracellular pH determinations on in vitro cultured insect cells.

- Suitor, E. C. Jr.,  
and Huang, S. S.                      Studies on the prothoracic gland of the  
moth Philosamia cynthia (Saturnidae,  
Lepidoptera).
- Jenkin, H. M.,  
Yu, H. M., and  
Fu, F. M.                                Some aspects of induction of interferon  
by Dengue virus in cell culture.
- Jenkin, H. M., and  
Lu, Y. K.                                Inhibition of growth of a trachoma strain  
(Bour) in a heLa cell culture by an inter-  
feron-like factor.
- Jenkin, H. M.,  
Huang, H. M., and  
Tan, R. G. B.                          Lipid analysis of a psittacosis strain  
(63C) using thinlayer, column and gas  
chromatography techniques.
- Papers read before scientific societies during the first six months  
of 1965.
- Love, A. H. G., and  
Phillips, R. A.                        Gastrointestinal transport of sodium in  
man --  
49th Annual Meeting of the Federation  
of American Societies for Experimental  
Biology, Atlantic City, New Jersey,  
9-14 April 1965.
- Mitchell, T. G., and  
Neptune, E. M. Jr.                    Sodium transport measurement in monkey  
small intestine --  
49th Annual Meeting of the Federation of  
American Societies for Experimental  
Biology, Atlantic City, New Jersey,  
9-14 April 1965.
- Alexander, E. R.                      The non bacterial etiology of acute lower  
respiratory tract disease in children: A  
review --  
6th Annual Meeting of the China Pediatric  
Society, Taipei, Taiwan, 4 April 1965.

Blackwell, R.Q., et al Preliminary report of abnormal hemo-  
globins in Filipinos --  
58th Annual Convention of the Philippine  
Medical Association, Davao City,  
Philippines, 19-22 May 1965.

Phillips, R. A. Cholera studies by the U. S. Navy --  
Invitational lecture before the faculty of  
the School of Tropical Medicine, Calcutta,  
India, 31 May 1965.