Turner Point by Point

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"Ethically, one is obliged to speak out when one possesses relevant knowledge that an act or statement is an abuse or a misuse of the truth…regardless of the effect one's speech may have" (Terence Turner, 2001)

In an email message sent in early September, 2000, Turner and Sponsel warn the President of the AAA that a major crisis is about to erupt in the anthropological community. They discuss the upcoming publication of *Darkness in El Dorado* by Patrick Tierney. The major issue is that Tierney accuses James Neel of deliberately starting a measles epidemic to test his hypotheses about the genetics of chiefdom. In inflammatory language, they warn that the revelations will shake anthropology. These accusations were quickly dismissed by numerous scholars and the book appeared without the accusation. In fact, the only place the accusation appears is in the Turner and Sponsel email. Since that time, Turner has taken upon himself the obligation of reviewing the Neel material. He has moved far from his original claim and now (Turner, 2001) has other issues that he feels need to be raised. The principle issue is the tension between science and humanitarian goals. Turner asserts that this tension led Neel not to do his utmost to help with the 1968 measles epidemic.

Turner asserts that he is able to add new information to the discussion of Neel since he went through the Neel archival material from the 1968 expedition. This review, he feels, supports the validity of his current allegations. We have also reviewed the Neel archival material. In addition, we have obtained the AEC grant proposals and we have reviewed much of the Neel published work on the expedition. Our conclusions about James Neel differ substantially from those of Turner. We believe that James Neel did the best that he could under very difficult conditions. In addition, Neel had a history of concern for the populations he studied. In this review we will document our assertions. We also invite other scholars to read the original material and not just the annotated bibliography produced by Turner and Stevens (Turner and Stevens, 2001).

Turner (2001; 9) discusses three major issues of concern about the 1968 expedition. Only one of this issues will concern us in this review: the actions and motives of Neel and the 1968 Orinoco expeditions revealed in Neel's own journal and correspondence and the critical review of evidence on the 1968 measles epidemic by the Brazilian medical team. Turner feels that his review has highlighted two implications- the priority of research over medical responsibilities and the lack of informed consent. We will begin by reviewing each of Turner's specific allegations. We will address the major allegations at the end of the review of the specific points.

The Turner allegations

I. Research and disease as an agent of selective pressure

Turner discusses Neel's interest in disease as a natural stressor and his "theoretical hypothesis of the uniformity of genetic capacity for resistance to disease across all human populations regardless of racial differences".

Neel was interested in disease as a stressor for human populations precisely because it was and continues to be a stressor on human populations and it is responsible as a selective agent in genetic variation. (See for example the following classic writings and modern discussions in the field of evolutionary biology - Cummings, 1997, Futuyma, 1986, Vogel and Motulsky, 1997, Durham, 1991, Dobzhansky, 1970, Cavalli-Sforza, Menozzi and Piazza, 1994, Cavalli-Sforza and Bodmer, 1971 and Bodmer and Cavalli-Sforza, 1976 and Mayr, 1963)

Neel discusses in the virgin-soil article (1970) and in his autobiography (1994) that the belief of most people at the time was that there was a constitutional difference between populations as to susceptibility to epidemic diseases. There was some limited opposition to this view from individuals who lived with indigenous populations undergoing epidemics during the 19th century. Neel was actually working against the view that different populations or races have genetically different levels of susceptibility. He felt instead that survival depended on collateral support from other individuals in the group.

> Present data suggest that given a comparable previous disease experience, comparable care when ill, and a less resigned attitude to the prospect of death, the death rate from measles in a previously unexposed Indian population would not be much if any greater than in a group of virgin-soil civilized Caucasians whose ancestors had been repeatedly expose to the experience of measles. (Neel, et al, 1970)

In Neel's autobiography he further explains his position that a view of Indians as more susceptible would allow westernized populations to do less to help those afflicted with the disease:

> It is a medical dogma that the isolated tribal populations of the world, who when first contacted some 500 years ago proved so susceptible to the epidemic diseases of civilization-measles, whooping cough, smallpox, tuberculosis and syphilis- have a special inborn susceptibility to these diseases. *This belief, even in recent years, has salved society's conscience as these populations have continued to exhibit higher death rates from theses diseases than long-civilized populations.* As a result of our experience I challenge this view as overly simplistic. In this connection, I point out that rarely if ever before has a medical team like ours been in a position to record an unfolding epidemic such as this one.

> When prior to the advent of an effective vaccine, a measles epidemic swept through a civilized population, only those not exposed during the last epidemic became ill. These were usually children, with immune parents to care for them. By contrast, when an epidemic hits a "virgin soil" population everyone goes down at the same time. The febrile phase of measles…is prostrating for adults as well as children…A group of Indians, all but a few simultaneously ill with measles, is paralyzed….the standard Indian response is to retire to a hammock to die; the jackknife position assumed in the hammock invites the collection of secretions in the base of the lungs, followed by bronchopneumonia
>
> …Our impression was that the Indian was just about as sick in the primary phase as your standard Caucasian--no more, no less…On the other hand, we saw a great deal of bronchopneumonia… With respect to the secondary response to measles, our records are clear. A year after the epidemic, we found both the vaccinated and those who had been ill with the disease to have developed protective antibody titers just as big as in Caucasian.
>
> We are not the first to feel that it is what we term the secondary aspects of such an epidemic that is responsible for so much of the mortality. (163-165) (italics added)

Neel often uses the term 'disease pressure' without discussing 'racial differences' in populations. He may say that the Yanomami give a picture of how disease may have affected human populations in the past. Neel clearly demonstrates that he was anxious to combat "racial" understanding of disease susceptibility.

Here (and elsewhere throughout the document) Turner cites references that are not applicable to the point he is making. For example:
COR 7 acknowledge measles vaccine, but has nothing to say about racial differences

II *Use of Vaccinations as Research Tool*

A. Neel's long-term interest in the use of vaccination for research.

Turner disagrees with Lindee (2000) that Neel was vaccinating because of humanitarian concerns. He states that

> Lindee does not, however, take account of the relevant historical context of Neel's long-standing research interest in the formation of antibodies to newly introduced disease in isolated populations (U.S. Atomic Energy Commission 1951) She does not question the reason for Neel's initial blood testing in 1966-7 that revealed the Yanomami' lack of measles antibodies. She assumes, without regard to context, that Neel's motives, like those of the vaccinations that followed, were purely humanitarian and apparently on this basis seems to exclude the possibility that he might have had a research purpose to the vaccinations. This does not follow logically and is historically inaccurate.

Turner bases this statement on Johnson's work on the ABCC and the inhabitants of the Marshall Islands. Johnson paraphrases Neel from a 1951 ABCC meeting where he suggests vaccinating the Marshallese Islanders to see their immune response. An examination of all the AEC material is beyond the scope of this report; however, we have found no reference to experimental vaccination in any of the AEC grant proposals from 1960 through 1973.

On the other hand, there is no question that Neel is interested in disease and disease pressure. He states in his 1965 AEC grant proposal:

> What new disease patterns will emerge as these primitive groups make the transition from an near- Stone Age to an Atomic age existence, and to what extent is there provided an opportunity to study in an intensified and telescoped form the genetic adjustments which presumably occurred as other groups, including our own ancestors, made this transition?

Also, in another 1967 AEC proposal Neel states:

> The USPHS Communicable Disease Center at Atlanta, Georgia has very kindly undertaken an extensive series of immunological studies on the blood sera collected in 1966. This battery includes, thus far, tests for antibodies to …coccidiomycocis, streptococcus, diphtheria, varoola, varicolla, …mumps, respiratory syncytial, virus, parainfluenza 1, parainfluenza 2, influenza 1 and influenza 2. In addition, …of the Venezuelan Institute has done very extensive studies on the antibodies against the arbovirus. These studies serve a duel purpose, in indicating to what extent some of the disease of civilization may have reached the Indian,… and in providing some insight into the kind of disease pressures that might have served as selective agents at this cultural level.

B. Other attempts to vaccinate

Turner (2001) states that the:

> Neel papers show that he envisioned vaccination campaigns for TB, Whooping cough, smallpox chicken pox, German measles and mumps in addition to measles. A letter to Dr. Robert Hingson of Case Western Reserve dated 15 September 1967 requests help for immunization campaigns against all of these diseases except mumps. This was over two months before he learned of the actual outbreak of the measles epidemic among the Yanomami of Brazil. Plans for these other vaccination campaigns appear to have been dropped following the 1968 disaster…

Turner views this as indicative of a planned research effort; however, the following correspondence addresses Neel's continuing interest in vaccination as a humanitarian effort. The correspondence begins months before there is any indication that measles has entered the area.

March 10, 1967 Neel to Hawkins (missionary, Boa Vista) asking about inoculating for smallpox, tuberculosis and measles. Measles vaccination is the most difficult because it must be kept frozen and the most expensive.

> With respect to the infectious, I believe very strongly that an ounce of prevention is worth a pound of cure. Of the various diseases against which they might be immunized, three stand out because of their importance and the simplicity of the immunization. …All three of these require just a single inoculation. The vaccinations I refer to would be against smallpox, tuberculosis and measles…With respect to measles this is more difficult and more expensive than the other two

Neel's 15 September 1967 correspondence to Hingson (medical doctor) is indicative of his understanding the importance of inoculating "virgin soil" populations: "We would welcome the opportunity to inoculate against [measles, smallpox, pertussis, tuberculosis] (assuming the Indians…would accept this)." He specifically addresses the notion of humanitarian concerns that are not in conflict with his scientific mission: "In addition to our scientific interests…we are impressed by the humanitarian opportunity here. As you must know, when a group such as this comes in contact with our culture, the decimation is fearful to behold."

Later correspondence (19 September 1967) to missionary Daniel Shaylor (missionary) expresses the same concerns for the health of the Yanomami:

> measles and whooping cough, not to mention smallpox and tuberculosis have not reached these Indians to any significant extent, and we are considering whether we could do some type of inoculation which would minimize the effects of these diseases when they finally do reach the Indian.

November 21 Neel to Shaylor

> Although our orientation is primarily research, we also are quite concerned with the humanitarian implications of extending proper medical services to the Indian, and would try very hard to lay a vaccination program onto our medical studies.

What Turner fails to note, although the documents are included in his index of the Neel material, is that upon Neel's return from the 1968 Orinoco expedition, he continued to obtain measles vaccine for the Yanomami.

April 22, 1968 Neel to Roche "Following receipt of your phone call, I contacted our Communicable Disease Center in Atlanta, Georgia, who suggested that I turn to Merck, Sharpe and Dohme, and to Philips Roxanne."

Phillips Roxanne responded sending 2000 doses that were very close to their May 9, 1968 expieration date (April 18, 1968, S.J. Russer to Neel). Due to this short date the

company suggested doubling the dose, effectively halving the total number of doses (April 22, 1968 Neel to Roche).

C. The Dow protocol

In 1970 Neel and representatives of the Dow company were in consultation concerning a field test of a triple vaccine, which included a vaccine against rubella. Turner regards this as additional evidence that Neel viewed the entire vaccination process as an experiment. We regard it as a continuation of Neel's desire to provide aid to this population. In addition, Turner states that the representative of the Dow company felt that Neel could not complete the follow-up blood sampling and that Dow called a halt to the protocol.

On Dec.23, 1970, Joseph E. Jackson, the Director of Biological Clinical Research at Dow wrote a four page single-spaced letter to Neel to discuss the protocol for a rubella vaccine field study. On December 30, 1970 Neel responds to Jackson and states:

> As we have come to grips with the requirements of your protocol and the realities our field situation, it has become clear that this is probably not the best population on which to field test your vaccine. ….the Indian villages are small and scattered; our contacts with them will be fleeting….this is certainly the largest problem, we are very dubious of our ability to obtain repeat specimens some six weeks after vaccination….I am sorry to take this position

This letter shows that contrary to Turner's assertion, it was Neel, not Jackson, who called a halt to the trial.

Dow had been reluctant to give Neel 200 doses of the vaccine without the trial; however in a letter dated January 6, 1971 Jackson responds:

> One of the original objectives, namely, to provide measles protection to Yanomami villages that may still be susceptible, can still be met. I have arranged for 200 doses of our commercial measles vaccine to be shipped to you for this purpose.

Turner also suggests that Jackson was concerned that the vaccine might cause infectious cases of the disease. Jackson, however, had a different concern. Jackson discusses at length the fact that the vaccine should not be given to pregnant women because of its teratogenic effects. One of the concerns of the early users of the vaccine was that the vaccine virus might spread from a child to the mother. This was shown not to be the case in the United States; however, Jackson states there have been no studies on rubella susceptible mothers. There were also two studies that indicated that vaccinated women do not transmit vaccine virus via breast milk. Jackson wondered if vaccinated babies might transmit the vaccine virus to the mother through the breast.

> It would be very unlikely that the lactating breast could serve as a portal of entry for this virus …It is essentially a question of what kind of physical contact susceptible women of childbearing age may have with rubella vaccines for it is already well known that rubella virus does not transmit efficiently as a respiratory agent in the tropical environment. The reason for this is unknown; but may be related to the sensitivity to U.V. light. This may all be a moot point since the meager amount of evidence available to date tends to suggest that the vaccine strains of rubella virus may have lost their teratogenic potential during the attenuation process.

The Dow company was not worried about cases of measles. Dow was concerned about the teratogenic effects of rubella and rubella vaccine for the fetus in utero. This is a realistic concern and Jackson addressed it. Measles (rubeola) can be very serious, while rubella is usually not a serious disease. However, rubella can cause serious birth defects. Even today, women who have not had rubella and are not immunized are encouraged to get a rubella vaccine several months before becoming pregnant (Merck, web page).

The Dow company decided instead to evaluate the vaccine on children in the U.S.

Question-when did the Venezuelan government take over vaccinating?

III Trips to Centers of Disease Control [sic] (CDC) in November, 1967

Turner states that the trip to the CDC was for the purpose of discussing aspects of disease research and not for consulting about the properties of the Edmonston B vaccine. However, Helen Casey at the CDC attended the meeting and she was the Chief of the Viral Immunoserology Unit. She was an expert on measles. She also gave him the measles titers and told him what villages had been exposed to measles previously (letter sent Special Delivery, Jan. 8, 1968) (COR 25)

Some of the correspondence Turner cites (26, 28) as proof of his statement discuss only the dates Neel would go to the CDC. However, we would like to note that after his return in April, 1968 Neel states that the CDC suggested the names of manufacturers he should contact about obtaining additional measles vaccine.

April 22, 1968 Neel to Roche: "Following receipt of your phone call, I contacted our Communicable Disease Center in Atlanta, Georgia, who suggested that I turn to Merck, Sharpe and Dohme, and to Philips Roxanne."

Please note that later in his discussion (see point VIII, B below) Turner states that Neel must have discussed measles vaccine with members of the CDC during this visit.

In a recent report on the Tierney book, a committee of the American Society of Human Genetics, reviews Neel's consultations regarding choice of vaccine. Members of the ASHG committee contacted Professor F. Black, a noted viral epidemiologist. Prof. Black stated that he had consulted with Neel about the choice of vaccine. He stated that

according to information available in 1968, Edmonston B provided longer lasting immunity than Schwarz and was the vaccine of choice for indigenous populations (ASHG, 2001).

IV Selection of Vaccine

Turner states that Neel was unconcerned about the properties of Edmonston B and took it only because he could get it for free, not because of its reactive properties. This statement is contradicted by the statements of Black (see above). Additionally, there was no money in the grants for the purchase of vaccine. None of the grants even mentions vaccinating. In a letter dated March 10, 1967, Neel to Hawkins (COR 57), Neel states that the measles vaccine is the most expensive.

It should be noted that Neel had very little time to get vaccine. He found out about the measles threat in a letter from Shaylor in early December. He received the vaccine on December 19, 1967 and was leaving for the field early in January, 1968.

Additionally, in April, Neel contacted Merck (the manufacturers of Schwarz) at the suggestion of the CDC. They declined to donate vaccine since they had a contractual agreement with the government of Venezuela.

It is noteworthy that the field diary lists three locations where Neel also vaccinated with Schwarz (a total of 65 doses). Where did this vaccine come from? We have indicated that Neel contacted the manufacturers of Schwarz and they declined because of a contractual arrangement with the Venezuelan government. This was true as of April, 1968. However, some must have been available earlier to the missions. The missions apparently had Schwarz by January, 1968. Neel used them and made no notation in the field diary as to which individuals got which vaccine.

In terms of documentary evidence, Turner cites numerous references that do not address the selection of the vaccine. These include:
COR 6 – Centerwell protocol for immunizing
COR 11- written after return from field, Neel to Wilcox, Michigan Public Health Dept.
Acknowledge receipt of gamma globulin
COR 40 Chagnon to Shaylor. They will vaccinate, nothing about choice of vaccine
COR 48 Ottati (Cyanamid) from DeSilva (PAHO(Pan American Health Organization)) request for measles vaccine

V. Planning and following the expedition's itinerary

Turner suggests that the epidemic did not alter the expedition's original plans. Turner says

> Neel's journal entry for 20 Jan (his last night in Caracas before going into the field) reports that he was informed at a party by the head of Venezuelan Indian Agency that measles had erupted in the Upper and Middle Ventuari (the next major river system to the west of the Orinoco) This, coupled with Neel's

> information that the epidemic had started in the Brazilian Serra Parima to the east of the Orinoco, and was at that moment working its way down the Orinoco towards his planned research area, should have told him that measles was rapidly becoming established in the whole area, if indeed it had not already done so. There was plainly no time to loose if medically effective preventative measures, such as vaccinations and quarantines were to be taken. Nevertheless, Neel did not alter his research schedule or his plan for the movements of the expedition, or attempt to take any special measures against the epidemic until a month later, when he got the first news of the outbreaks of measles at Ocama and Mavaca (Turner, 2001: 18-19)

Turner also states:

> He [Neel] did not take the implied offer of Venezuelan help from the Chief of the National Indian agency with whom he had spoken at a party at Caracas the night before the expedition left for the field, presumably because he was worried that bringing a group of alien personnel would interfere with his research objectives (Turner, 2001: 48)

This is what Neel's journal says – January 20, 1968

> …threw a party at Anthopologia, celebrating a new mongraph by Dr. Wagner. Saw the T…- T… artifacts which may be the oldest yet from South America. And a genuine invitation for a quickie to the Wararo. But, more important, Eddie Romero, "Commissioner" for Indian Affairs was present and news of measles in the lower Ventuari and Yanamamo and Maks on the Upper V, and what could we do about it. **Discussion: invite them in also**. We will be swarming with Indians if all this comes to pass and the problem is now not to over-commit our troops at any point. Plans and replans. (Bold added)

There are three important points – First, contrary to Turner's assertion, Neel decided to accept aid. Second, Neel was informed about measles along the Ventuari because that is where he was going. Third, the note "plans and replans" indicates that Neel was reformulating his plans. Although we do not know what Neel's precise plans were, we do know that when he arrived in Santa Maria de Erebato he did vaccinate.

A careful review of the expeditions itinerary documented in the Neel field journal indicates that two groups left Caracas on January 20. One plane with Chagnon, Asch, Roche and 12 others went to Mavaca. Neel and 12 other members of the field team went to Santa Maria de Erbato near the Upper Ventuari (Neel, p.50). The two teams were approximately 160 miles apart. Neel does not fly to join Chagnon and Asch until February 6. In the meantime the Roche team began vaccinating at Ocama near Mavaca. The Neel team vaccinated in the area around Santa Maria de Erbato and in fact Neel states in his field notes "status of Upper Ventuari group unclear. We could send a messenger for all unvaccinated to come. Padre to give BCG, we to give measles" (Neel, p.62)

We have produced a data base of the itinerary of the Neel field journal (Appendix A). We have also produced a map of the field sites based on the field journal, in particular the map that Neel drew on page 69. (Appendix B)

On January 21, Neel and the rest of his team flew to Santa Maria de Erebato on the Upper Caura, just east of the Upper Ventuari. They immediately received permission to work and vaccinate in the area. They vaccinated nearly 70 people in the area. It should be noted that in this area they only vaccinated children under 5. Measles had been through the area previously. Neel knew this because of previous blood collection in the area. He does not arrive at Ocama until February 6. Between Feb 6 and Feb. 17 when the all Orinoco plan was devised he vaccinated nearly 300 people. It should also be noted that the entire time he was in the Upper Ventuari, 243 vaccines were being given by missionaries in the Padamo and surrounding areas on the Orinoco River (Neel field notes, pp. 99 [point 4 all Orinoco plan]

VI Outbreak of the epidemic

Turner suggests that Neel should have known about the measles epidemic from conversations in Caracas. He should have also moved more quickly to vaccinate before he had confirmed information about the measles outbreak in the area he was about to enter. Turner states:

> The All-Orinoco plan, in sum, was a hasty stop-gap measure concocted on the spur of the moment, and was a dead letter virtually from the time of its conception.

It is important to note that Neel received 2000 doses of vaccine in the United States. One thousand doses were sent In December with missionaries to Brazil where he knew the epidemic was already advancing.

Neel's journal documents the process by which he became aware that an epidemic had reached the area where he was located.

On 16 Feb 1968 (p97 of field diary) Neel writes of the measles story—put together with the French group. This is based on what has happened at Ocamo. Roche's team detail all the information they have seen since arriving in the field and the vaccinations they gave.

23 January Brazilian Child 1 with high fever and atypical rash
diagnosis measles, 30 vaccinations

5 February Brazilian – Male age 21, friend of first, with high fever and atypical rash
diagnosis not thought to be measles Also seen on 7 February still with infection and pneumonia and given antibiotic

13 February Later brought 1 year old-Brazilian boy- with high fever, conjunctival infection no rash with signs of pneumonia. Given antibiotic
Died 15 February

During the first month in the field he sees three cases of measles, all in Brazilians. He has a log of vaccinations. He did vaccinated during that time period. (Field journal pages 110-111), but adjacent to the Upper Ventuari. Roche's team was vaccinating at Ocama. (See appendix A for a log of measles vaccinations)

Until February 15, the cases of measles they saw had been among Brazilians. Neel (February 18) states in his journal (p.103)

> But the climax at 9:00 when a group from LeChosa, who had stayed at the priests village' turned up here also in flight and brought with them one with measles at the 99% level. So, it's here! A race between vaccine and the real McCoy. A trip across the river to get the priest mobilized, packing, and soon we leave for Platanal where we will immunize and spend the night, and then on the Pats.

After the All Orinoco scheme was developed, Neel vaccinated between 272 and 553 people.

VII Spread of the epidemic

Turner claims that Missionary letters did not indicate that Neel had averted a tragedy.

Notes from the Missionary news indicate that Neel did save many lives. It was very flattering about Neel. In addition, Neel continued to get vaccine to send to the Venezuela after he returned.

VIII Neel's correspondence with Marcel Roche

A. Responsibility for the epidemic

Turner asserts that Neel was worried that the expedition was responsible for the outbreak of measles. Turner suggests that the presence of the index case--the Brazilian boy – was important to Neel because it would relieve Neel of responsibility for causing the epidemic. There is no indication that Neel ever thought this.

Turner cites DOC 5, 6 and 7 as indicating Neel's concern. We have reviewed the documents and do not find any indication of this.
DOC 5 Western Union telegram saying measles vaccine acceptable
DOC 6 Neel to Roche asking for assurance that the donation is acceptable
DOC 7 Cable Roche to Neel – 1000 doses of vaccine and globulin are being shipped
COR 50 Neel to Roche – more vaccine on way. Neel contacted CDC for information about vaccine.
COR 181 Roche to Neel – Vaccine has arrived. Ministry got vaccine from Sharpe. Ministry will use vaccines Neel sent as soon as possible because of near expiration date. The important point is that the Ministry of Health agreed to use the vaccines, not that they would only use Schwarz.

Only in COR 16 does Neel ask for a clinical impression of the Brazilian boy from Roche Talks about collapse of amenities and how this affected survival

In none of these letters or documents do Neel or Roche ever suggest that the expedition was responsible for the epidemic. They discuss only the arrival and use of various vaccine donations.

B. Permission to Vaccinate

Turner is responding to an assertion made by Lindee that Roche had cabled Neel with permission from the government to vaccinate. Lindee later recognized that this cable referred to the donations made in April, 1968, not January, 1968. Turner is, however, persuaded that Neel must have had permission by Lindee's indirect evidence. We would like to add the following:

On December 11, 1967 Neel wrote to Layrisse
"I believe I can obtain about 2000 immunizing doses of vaccine free.CAN YOU OBTAIN PERMISSION FROM THE VENEZUELAN GOVERNMENT FOR US TO VACCINATE ALL THE INDIANS WE COME IN CONTACT WITH?"

There is an undated hand-written note (probably written by Neel) with Layrisse's name at the bottom. It states in language that mimics the Neel letter:
"Agree bring 2000 immunizing doses measles vaccine"
We do not know exactly what this is, although it might be a written account of a cable received by telephone. Elsewhere in the Neel documents there are handwritten instances of Neel either writing out the text for cables he sending or writing the confirmation of a phone message.

C. Roche is concerned about the use of Edmonston B

In a letter dated May 2, Roche informs Neel that the Venezuelans will not use the Edmonston B that Neel had shipped .

Turner states:

> The "studies" on the Schwarz to which Roche refers may well have involved Dr. Helen Casey and other associated with the CDC during the preceding year. These studies must in any case have been known to Neel, or at least have been made known to him when he visited Casey and others at the CDC a couple of months before leaving for Venezuela.

This is directly contradictory to Turner's earlier assertion (Point III) that Neel did not discuss the vaccines with scientists at the CDC when he was there.

> …that Neel's trip there shortly before leaving for Venezuela was for purposes of discussing aspects of disease research, but not for consulting on the properties of Edmonston B vaccine

IX Vaccinations: Where and how many carried out; use of gamma globulin
X Centerwall's protocol and the half village policy

Turner states that the use of gamma globulin demonstrated "the relative indifference and low priority that seems to have attended other dealings with the vaccine.

Both manufacturers of measles vaccine recommended the administration of 0.01cc/lb of body weight of measles immune globulin (MIG) to reduce the effects of the measles vaccine. The maximum dose stated is 0.5cc per individual. This dosage is based on trials with children up to a maximum weight of 50 lbs. There had been no studies of the mediating effects of MIG in adults, since adults had either been vaccinated as children or had had measles and were immune. Neel was sent 1000 doses of MIG which corresponded to 500cc of material. Centerwall noted in the January 10 letter to Black, Associate Professor, Department of Epidemiology and Public Health, New Haven, CT, that this dosage would not be adequate to attend to the needs of adult Yanomami who weighed more than 50 lbs. His letter states:

> We have been able to look up most of the references relative to this and find as you suspected no support for 0.5cc of gamma globulin being adequate for measles vaccine modification for average adults. It would appear that the 0.01 cc per pound of body weight or 0.5 cc per individual statement refers mainly to children although it is not so stated and is thus ambiguous. We plan to avoid vaccinating the very young, the old and the acutely ill and will graduate our dosages as best we can on the remainder covering half villages at a time and following with aspirin where possible and when needed.

This implies that in the days before they left for the field they realized they did not have adequate supplies of gamma globulin and decided to do the best they could by the use of the Centerwall protocol.

Centerwall's half village protocol was in direct response to gamma globulin. The half village protocol might have worked if there had not been an epidemic in progress and the field team had not felt that they had to vaccinate or treat everyone they encountered.

XI Neel's low priority for vaccinations as compared to research

Turner discusses at length his contention that Neel's humanitarian aims were always secondary to his research goals. This contention is based to a great degree on the following statement from Neel's journal (p.80):

> At Patanowa-tedi we will also make our principle collections of biologicals, and I will concentrate on this while Bill does PEs. Thus, I will get stools and soils while Bill does PEs for 3-4 days—then we get blood, saliva, and urine (? And dermats), <u>then</u> inoculate if at all.

Turner makes much of the "if at all" statement in Neel's journal. We have another interpretation and an alternate reading of the material:

"if at all"—(p. 48). It is important to note that Neel addresses the vaccinations specifically as a "a gesture of altruism and conscience" ." [5 February 1968 entry in field notes: 79]. Likewise, he notes how frustrating this vaccination process is: "more of a headache than bargained for." However, he *never* suggests that he ever "seriously considered jettisoning the 'altruism and conscience' of the vaccination campaign and [abandon] the vaccinations altogether" [Turner, 2001: 32]; he does, however, clearly state in frustration that he would like to put the vaccinating into the "hands of the missionaries." Moreover, the context of "if at all" must account for the fact that the Indians had a history of fleeing those administering the vaccinations: "they took off in fright when they heard we were giving inoculations" [1 Feb. 1968 entry in field notes: 76]. Vaccinating "if at all," administering the vaccinations "at the very last." [5 February 1968 entry in field notes: 79], or placing the vaccinations into the hands of the missionaries may be indicative of this "flight" problem alone.

It should also be noted that this was all written before Neel was aware of the magnitude of the epidemic and before the all-Orinoco plan was devised. Once he was aware of the magnitude of the epidemic he immediately took steps to prevent further spread of measles. At this point, he gave preventative doses of MIG to those exposed, but who were not yet sick, but not vaccinated. He also administered penicillin to those who were the most ill. It must be remembered that no matter what Neel felt, he did vaccinate.

XII Neel's upper respiratory infection

Neel did have an upper respiratory infection. Two months previously there had been upper respiratory infections among the Yanomami

XIII Neel's search for the genetic basis of male dominance

Turner states that Neel's views on headmanship were eugenic and that Neel himself was a genetic reductionist. More to the point, he feels that Neel influenced the way in which Chagnon described the Yanomami. It should be noted that during this time period Hamilton (1964) and Wilson (1975) were formulated their hypotheses about sociobiology. Neel was not the only person thinking about genetics and behavior.

A. Genetics and Chiefdom

Neel discusses his views on chiefdom in the 1966 grant proposal

> One of the chief findings to date is the greater variance of male than of female reproduction, a result of polygyny. Since it is the chiefs and subchiefs, who earn these positions on the basis of ability, who are most polygynous, here is an opportunity to attempt to study the action of natural selection.

From the 1968 grant proposal:

Possible problems in the future

c. What measurable attributes distinguish the (more polygamous) chief from his (less polygamous) fellow villagers/ This is the most difficult of the questions we should like to approach. From the observation on each individual, we can readily compare chief and non-chief with reference to bodily dimensions, blood pressure, uric acid, gamma globulin levels, etc. More important would be a comparison on the basis of psychological characteristics. Hopefully during the third year of this extension we will have an anthropologically oriented psychologist in the field working on this question.

One of the main ways Neel wanted to study differences through cranial and other morphological measures. These were the exact measures that he jettisoned when he needed to direct his attention to the vaccination process.

B. Neel and Eugenics

From Neel's autobiography:

> What I see as the larger responsibilities of the human geneticists have received relatively little attention in recent years. It is a great paradox that the human geneticists (read: eugenicists) of 70 years ago, short on specific knowledge concerning the basis of human inheritance, were long on concern for the future, whereas the human geneticists of today, increasingly long on specific knowledge, fearing the opprobrium of a eugenic label, appear, to have retreated from that concern for the future. In a world where some difficult decision must soon be made, if only by default, it is incumbent upon the genetic-minded to come forward with a more holistic approach to the genetic aspects of the present human dilemma than is now evident.
>
> Unfortunately, without some reordering of genetic research priorities at the national level, a continuing emphasis on the prospects for gene therapy will undoubtedly dominate research on the "service" aspects of human genetics for the next decade…
>
> .

Neel goes on to discuss prenatal diagnosis which is where he locates his beliefs about genetics and society

> It is likely that a program that so espouses prenatal diagnosis followed by abortion as that I have presented will encounter ethical/religious concern and even opposition. The issue is increasingly whether sanctity of life takes precedent over meaningful life. To those who argue that the continuing presence of the seriously genetically defective among us would be a humbling reminder of the need to offer thanksgiving and compassion, I suggest that. Despite all we can do in the way of eliminating genetic disease, there will still be no lack of human tragedies to test that compassion.

C. Neel's Humanitarian Concerns

At the same time there is ample evidence of Neel's humanitarian goals. From the time of finding out that the Yanomami were susceptible, Neel continued to state his

desire to vaccinate. He did his utmost to obtain vaccine. He continued to do so after his return from the field.

As an example of Neel's belief about the relationship between science and humanitarian efforts we quote from a talk he gave at the PAHO (Pan American Health Organization) meeting of the IBP (International Biological Program).

From the 1968 grant proposal—difficult to read-Given at the PAHO, IBP meeting.

Some moral issues

It seems appropriate in this presentation to an audience of scientists to stress research opportunities. But as in the … recognize the issues…scientific inquiry for..and humanitarian consideration, it also seems….briefly what these studies and especially…section, might mean to the Indian. We have no accurate…of relatively pure Indians left in the Americas nor of …of persons of mixed but "substantial" Indian ancestry. Estimations on the order of 16,000,000 (17,20,24 have been made for the former…latter is easily several times that figure. We are talking about large numbers of people.

Who among us can read the history of the relations between the early settlers of his country and the Indian without deep shame for the barbarism heaped upon a people who were driven to defend the land they occupied. The world is watching my country as it agonizes over the Negro problem—it might equally well be watching the Americas for signs of a bleated, moral resurgence with respect to the Indians. How satisfied are any of us with the official programs of our governments for the health, economic advancement and education of the Indian? How can we translate the results of our scientific investigation into concrete …programs which…other governmental measures. It is a …among the Indian without parallel economic measures to ensure food for the extra mouths. Nor does it seem likely that the accident proneness of the Indian (refs in..) so easy to …of violence and lack of familiarity with our gadgets, will yield to education until the frustrations which lead to accident proneness are relieved.

In a world which seems groping for perspective, the Indian provides a reference point from which to view the fantastic disruptions which modern man, intrinsically still an Indian, has brought about. There are those who will take umbrage at my characterization of we representatives of western Culture as "intrinsically still Indian"…of the so-called intelligence tests which purport to show the inferior intellectual qualities of the American Indian, just as I am aware of similar results…to the American Negro. These results can and have been used for less than equal schooling. But in both instances it is a matter of a culturally deprived and alienated group, perhaps also subjected to early nutritional deficiencies, whose role in …intellectual performance we are just beginning to recognize, being judged by tests designed and standardized on a very different group (see also 4). But these remarks I do not mean to dismiss the possibility of intellectual differences between ethnic groups, but only to insist that to date, the data are grossly inadequate, and we who call ourselves scientists must adhere to the null hypothesis, the more so since its various alternatives can be conveniently misused by those who would evade their social responsibilities.

> culture shock as I realize how greatly in a short period of time we have contrived to d… Be this last digression as it may…I return from the field there is a period of disruption.. our…profound ignorance of the long range results of this dis…Now in…of greatly intensified concern over these problems, studies in depth of the Indian, within or without the framework of IBP will surely contribute not only to his well-being but also to our own perspective and, eventually, the necessary adjustments towards which we are evolving.

This statement, read to a group of scientists, indicates that Neel was clearly not a racist with eugenic goals. It also indicates a long-standing interest in the well being of the Indians, a perspective very advanced for the time.

Ethical issues raised by the Neel papers

Much of what Turner says in this part of the paper is based on conjecture. He uses his interpretations of the material as fact. His major complaint is that Neel gave his first priority to research and the second to the humanitarian effort. A basis for this accusation is that the measles vaccination program was a research effort. There is no evidence for this in the Neel papers. There is no mention of anything like this in the grant proposals. Neel is interested in the effects of disease on Indian populations; however, he never states anywhere that he would vaccinate to mimic a disease nor that he is vaccinating to test the effect of the vaccine on the population.

We note that if it had been part of a research protocol, Neel would have been better prepared. It would have been discussed in the grant proposals. There would have been funds requested in the proposals for vaccine. He would not have scrambled to get vaccine as a donation at the last minute before he entered the field. And in addition, he certainly would have remained with the villagers or returned to them in a few days or weeks to get additional titers after they were vaccinated. We know he did not do this, and in effect, this is one of the other major allegations against him. In addition, Neel gave the Schwarz vaccine when it was available. If he were working on an experimental protocol, he would not have given different vaccines and not recorded individual differences.

The Brazilian team suggests (Lobo, 2001) based on the 1970 Dow proposal that the 1968 vaccination program was designed to test the efficacy of the vaccine and the Indians response to it. It should be noted that Edmonston B had been in use for a long time. The Dow triple vaccine was new and was to have been field tested. The reason the Dow protocol was curtailed was because Neel stated that he could not get (based on his 1968 experience) adequate information to test titers to the vaccine. This is the most important part of checking an immune response. Instead, Dow field tested the vaccine on American children. The Brazilian team also suggests that the selective use of gamma globulin may have been experimental. We note (see above) that gamma globulin was in short supply as a result of children's dosage amount. Neel was supplied with this dose because in the United States and Europe adults were not inoculated because of

immunization or immunity by childhood exposure. The situation was different among the Yanomami.

Turner suggests that Neel should have expected and planned for a serious reaction to Edmonston B. The manufacturer's protocol gives indications, contra-indications ands side effects of the vaccine. The field team knew that high fevers were a possibility as was a mild cough and conjunctivitis. These were reduced by gamma globulin. They brought with gamma globulin as well as aspirin to treat the fevers. Pneumonia is not a complication of the vaccine, but of the disease in this population.

In terms of informed consent, please see the section of the AAA report on informed consent in 1968. It is important to note that Neel was the author of the WHO reports (1964, 1968) on sampling indigenous populations that has a section entitled Relations of the Research Team with the Population Studied. In it he discusses the respect for persons. This is the first of the later Belmont Report ethical principles. Respect for persons is also discussed as autonomy. Informed consent is the outcome of the application of this principle. While the term informed consent is not used in the WHO document that is not surprising, since it was not in common usage at the time. But the principle is clearly articulated. In addition, Jane Hill, Chair of the El Dorado task force talked to two members of the field team about informed consent during the 1968 expedition. They both state that individuals were told that blood was taken so that they could look for disease inside the blood. In addition, we have surveyed 15 other researchers on human population biology during this time period as to their methods for obtaining consent. They all seem to have followed the same procedures the Neel team followed. A further discussion of this can be found in the AAA El Dorado Task Force Report.

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