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stove was used, the principle of which is a large fire-place in the main hold of the ship with air pipes led through each cabin, and along the side of the ship to the extreme end forward; but there was difficulty in regulating the amount of heat. My cabin, situated opposite the main hatchway, receiving the first of the heat, was too warm, and collected a very great amount of moisture in consequence, while at the extreme ends of the ship the decks and cabins were cold; that defect no doubt could be rectified, but there would be a loss of ventilating tubes for ventilating the habitable deck if the Sylvester stove is again used.

222. Therefore, taking everything into consideration, you consider the mode adopted on board the "Alert" as the more effective of the two?—Yes, except as regards the expenditure of coal; and with regard to that, although I believe it to be about equal for each system adopted, I cannot speak with certainty.

223. (*Admiral Collinson.*) Was the moisture on the lower part of the upper deck ever frozen with you?—owing to the equable temperature which we were able to obtain, and to the ship's side being lined with fearnought previous to our leaving England, there was very little ice formed inside of the ship. In fact I do not remember any, except on the one or two bolts which had been accidentally neglected to be covered; but certainly ice was not formed to any extent. The temperature of the lower deck varied between 40 degrees and 50 degrees the whole winter.

224. Where was the thermometer placed?—I had a great number about the deck; they were hung up in five different places on the mess deck at different heights from the deck, and other thermometers in other parts of the ship.

225. Are you of opinion that, as far as ventilation is concerned, the lower deck of the "Alert" was in better condition during the winter than that of the "Resolute"?—I can only speak by memory. I know that on board the "Resolute" the beams were always damp, like the "Alert's," and that the deck itself was frequently wet, and I believe more frequently so than the "Alert's."

226. (*Dr. Fraser.*) I should like to ask what was the general cubic space which you allowed per head, or which you were able to give per head?—I cannot state fully; but the crew consisted of fewer men than the crew of the ship when she was a man-of-war, occupying the same space, and each man's hammock had a double berth. Certainly they had a very much larger space than the crew of the "Resolute."

227. So far as you know or observed, the condition of the atmosphere in the ship was not bad?—Dr. Moss can give the exact information to the Committee on the subject; observations were frequently made of the state of the air, and always reported to me by the medical officers as being satisfactory.

228. (*Dr. Donnet.*) Was the ventilation of the lower deck dependent upon the several stoves distributed about the ship?—Upon that and the two hatchways to which doors were fitted, but through which there was an interchange of air every time a man or officer went up or down the ladder.

229. Were these hatchways the only outlets for air, and the only means of admitting fresh air?—I have already stated that the plan adopted of heating the ship by five or six stoves enabled a system of ventilation to be arranged with their funnelling. The whole ventilation of the ship depended upon the two hatchways and the stove funnelling, and two tubes which acted as down-takes, one in the ward-room and one in my cabin. I should say apparent down-takes, for the cold air in descending at the outer circumference of the tube is rendered visible as it arrives in the warmer atmosphere. The heated air in the same way, ascending through the centre of the tube, makes itself visible on arriving at the outer cold air. I think it was only the stove funnellings that were absolutely up-takes, with the exception of the hatchways when the door was open.

230. Did you consider this system of ventilation as perfect as it could be made on board an arctic

ship, and were you able by it to renew the atmosphere of the decks frequently?—It is as perfect as necessary. With only a few degrees difference of temperature between the habitable part and the outer air very slight currents are formed; but with the difference of temperature between the habitable deck on board a ship in the arctic regions and the outer air, which is always from 80 to 100 degrees, the very smallest opening enables a very strong current of communication to be established, and sufficient air is interchanged then through a small opening to ventilate the habitable deck.

231. Did this system of ventilation tend to diminish the moisture of the atmosphere?—Immediately an opening was made which enabled extra ventilation, so immediately the damp collected on the beams in consequence of the large down rush of cold air. I may state that the increased dampness of the lower deck beams with increased cold, is produced in the same way by the cold being communicated down through the deck by conduction.

232. What amount of snow did you place on your upper deck to preserve the warmth of the ship?—The embanking the ship with snow was continued up higher on the outside than had formerly been the case, and the upper deck had an increased layer of snow. The layer originally was about 1 ft., but I allowed this to accumulate throughout the winter, and at the end it had certainly collected to a thickness of over 2 ft. Also a very complete covering was arranged for over every hatchway, and by this means no possible outer air could get down into the holds by any communication, and consequently the warmth of the air down there was not lowered below a temperature of + 28, which would not freeze the provisions. The holds were at the same time frequently opened in communication with the lower deck.

233. What means did you take to keep the bilges sweet, and what disinfectants did you use?—The ship was thoroughly dry; there was no water whatever in the hold; had there been any, it would have been frozen.

234. Did you ever remark any foul smells arising from the holds?—No, none at all, excepting in the summer, after the thaw had commenced, and a total restowage of provisions was going on.

235. Did you find it necessary to alter the berthing of your men, or was each man berthed, and allowed to retain his berthing during the commission of the ship?—There were probably half-a-dozen men whose sleeping berths had to be altered in consequence of being too near the cold air coming down the hatchway. The ship's steward also had to be taken out of his cabin in consequence of its dampness, and made to sleep in a cot, he being unable to take the same precautions that an officer could in his cabin.

236. (*The Chairman.*) Proceeding to the 8th paragraph: "Under the generally depressing influence of arctic service the importance of promoting hilarity and cheerfulness as sanitary agents is paramount." Was that attended to?—Nothing could have been more cheerful than the lower deck of the "Alert" throughout the winter; owing to the increased space, we were enabled to devote greater space than is usual for the recreation and comfort of the crew.

237. (*Dr. Donnet.*) Was it remarked that of those who held back from these amusements some afterwards suffered from scurvy?—No one held back. On each Thursday, when Penny Readings were held, there would only be two or three men left sitting in their messes; and the daily school on the lower deck was very fully attended from first to last.

238. (*The Chairman.*) Proceeding to the 9th paragraph: "Men before they are selected for sledge or travelling parties should be examined by the medical officers, as to the existence of any defect that might possibly render them inefficient, and they should be again examined on their return to the ship." Was that strictly carried out?—Yes, and a report made to me by Dr. Colan.