

SUGGESTIONS
RELATIVE TO
OBJECTS OF SCIENTIFIC INVESTIGATION
IN
RUSSIAN AMERICA.

SMITHSONIAN INSTITUTION,
WASHINGTON, *May 27th*, 1867.

Hon. JOHN F. HARTLEY,
Ass't Sec'y of the Treasury.

SIR: Your letter informing us that an expedition was to be sent to Russian America, and inviting suggestions as to scientific points worthy of attention, has been duly received, and I beg leave to enclose, in reply, the accompanying memoranda relative to meteorology, ethnology, and natural history, which we should be pleased to have placed in the hands of the gentlemen composing the party. The meteorological suggestions were prepared by myself, the ethnological by Mr. George Gibbs, and those which relate to natural history by Professor Baird.

Detailed instructions for meteorological observations, for making, preparing, and packing collections of natural history, hints for ethnological research, and blanks for recording vocabularies, accompany the parcel transmitted.

With many thanks for your courtesies in asking the co-operation of the Smithsonian Institution, I remain,

Yours respectfully,

JOSEPH HENRY.

Secretary Smithsonian Institution.

I. METEOROLOGY.

1. Keep a journal of the weather at regular intervals of time, noting—

- (1.) The direction of the wind.
- (2.) Face of the sky as to cloudiness.
- (3.) Direction of motion of upper and lower clouds.
- (4.) Rain, snow, hail, fogs, &c.
- (5.) Temperature of air and water.
- (6.) Pressure of air.
- (7.) Moisture by wet and dry bulb thermometers.

2. In recording any observation give the exact time, latitude and longitude of ship, and name of the observer.

3. When but two observations are made in the course of the day the hours should be 8 a. m. and 8 p. m.; when three observations, at 7 a. m., 2 and 9 p. m. If the number of observers is sufficient a record of temperature and pressure may be made hourly or bi-hourly for a week together when the vessel is stationary, in order to ascertain the daily variations. Unusual phenomena should be recorded at the time of occurrence.

4. The indications of a maximum and also of a minimum thermometer should be recorded at least once a day.

5. The observations with the wet and dry bulb thermometer are very important and should be carefully made at least three times a day in a place freely exposed to the air. The difference between the wet and dry bulb will be less in warm weather when the air is nearly saturated with vapor, and also in cold weather when it contains very little moisture. The wet bulb, however, should always be the lower; but in some cases during a low falling temperature the water absorbed by the covering of the wet bulb may become frozen, and while evolving its latent heat will prevent as a rapid a descent of the mercury as in the case of the dry bulb, which may be at the time exposed to a current of cold air. If the observation, however, be continued sufficiently long and the temperature remain steady the covered bulb will finally indicate the lower temperature though it be covered with a coating of ice.

6. The force of solar radiation should be observed every day at noon, with a blackened bulb thermometer, surrounded by a vacuum, enclosed in an outer glass envelope. In default of this

apparatus a common thermometer may be used, the bulb of which is surrounded by flocculent black wool.

7. Note every appearance of shooting stars and fire balls; give their direction of motion among the stars, starting and ending points; give the intensity of light of fire ball as compared with that of day; the size compared with that of the moon. If an explosion is observed listen for sound for perhaps two or three minutes. Make special observations for shooting stars on several nights about the 12th or 13th of November. Observations should be kept up for several nights on, before and after these epochs for the purpose of comparison. Other periods less marked may be noted, namely: April, from 23d to 24th; June, from 15th to 20th; October 18th; December 6th and 7th; January 2d.

8. The temperature of the surface of the water should be frequently taken, first to ascertain if there are any variations from day to day, when the vessel is at rest in the same place, and, second, to determine the variations from place to place when the vessel is in motion; in certain cases, such as entering a warm stream the change may be very sudden.

For determining the surface temperature, the water may be drawn in a bucket, care being taken to let it remain long enough overboard to obtain the temperature of the water. If a thermometer be let down into the water to obtain the surface, or deep sea temperature, its bulb should be surrounded with several coatings of cloth, in order that the temperature may remain long enough stationary to admit of its being read on deck without sensible change. Care, however, must be taken that the thermometer remain in the water sufficiently long to acquire the temperature of the latter.

9. Frequent observations should be made to ascertain the direction of currents by a comparison of dead reckoning with astronomical observations, and, to afford data for subsequent determinations, bottles containing a sheet of paper, giving the latitude, longitude, and time, with directions as to where the paper is to be sent by the finder, should be frequently thrown overboard. The bottles should be of transparent glass in order that the white paper may be seen at a distance. The ordinary black bottle is so near the color of the sea as to escape notice unless cast on the shore by a wave.

10. The color of the water should be noted as this may be important in connexion with currents, shoals, &c. Extensive tracts of green water have been reported, lying at some distance off the coast and extending as high up as Queen Charlotte Islands. The existence or non-existence of these should be determined as far as possible.

11. After a storm, measure the height of the waves by ascending the shrouds to an elevation which shall just bring the line of vision of the distant horizon over the crest of the wave, while the ship is in the hollow. Note time when high waves are observed without a storm, and also their direction; they give indications of a storm having occurred at a distance.

12. Note the appearance of the sky over stream like that of the Gulf when at a distance from them on either side, also, whether water-spouts occur more frequently within their limits than in other parts of the ocean. Make frequent observations of the surface temperature on approaching and leaving the streams, also their width.

13. Carefully note the time and place of entering and leaving the northeast trade-winds.

14. The direction of the motion of the highest fleecy clouds is important, and should be entered whenever they are seen. The direction of the lower clouds, as well as the surface wind, should be noted.

15. In recording fogs, when they are at a short distance, give the height of the upper and lower surface when not resting on the water, and be careful to note the temperature of the air and water before and after entering. In sailing near the land observe the condition of light-houses in regard to fogs—whether the top or bottom of the tower first becomes visible, as seen across the fog.

16. Hazy weather is sometimes produced by what is called dry fogs, which may be due to volcanic dust or other solid substance in powder. If anything of this kind be deposited on deck, specimens should be carefully collected and preserved.

17. Note the points along the western coast of Central America where the trade-wind from the east blows strongly across the Isthmus to the Pacific as well as the direction and intensity of this wind.

18. In the case of thunder-storms note the direction from

which the storm comes, the time of its passage across the ship, and, by subsequent angular observations, determine the length and breadth of the meteor, as measured on the surface of the earth, and also its altitude. The whole disturbance of the atmosphere, in case of a thunder-storm, is frequently confined to a space of three or four miles in one direction, and from two to three miles in the other.

The change of the wind should be noted during the approach, passage, and end of the storm, and also the character of the lightning, whether sheet, zig-zag, or ramified, and particularly whether it is in the form of a globe or ball of fire. Note also the character of the thunder, whether loud, faint, a sudden explosion, or a continued reverberation. If the ship should be struck all the particulars of the effects produced should be carefully described.

During the passage of the electrical discharge along the mast of a ship the natural electricity of all the other parts of the vessel will be disturbed, and in this way effects may be produced in the cabin not immediately referable to the primary discharge.

It is stated that thunder storms are not observed on the ocean beyond a certain latitude, and, also, on land, along the north-western coast of America, there are places where they never, or very rarely, occur. Facts in regard to this point are interesting.

19. In case of the occurrence of a tornado or cyclone, every change in the direction and intensity of the wind should be noted, the barometer and thermometer constantly watched, and their indications given, the appearance of the sky, and particularly the motion of the lower and upper clouds, as compared with the surface wind. If the centre of the storm be passed through, a lull will probably be observed coinciding, perhaps, with the lowest altitude of the barometer, and followed by a change in the direction of the wind. If the vessel be in north latitude, and the storm be that of a true cyclone, the direction of its centre may be determined by facing the wind and extending the arms. The right hand will then extend to the centre of the storm.

Copies of the logs of all vessels which are subsequently met with that have encountered the same storm should be collected.

20. In observing the Aurora, note whether an arch be formed,

the bearing of its apex, give its altitude from time to time, and any changes that may take place in it, and whether a dark cloud exists in the segment beneath, while the other parts of the heavens are unclouded. When Auroral beams appear they frequently move laterally along the arch. Note whether this motion is to the east or to the west. This observation is important in ascertaining whether the electrical discharge, to which the Aurora is undoubtedly due, be to or from the earth.

When the beams of the Aurora shoot up toward the zenith, note whether any mistiness in the atmosphere becomes instantaneously perceptible, and, whether this continues or soon disappears. Note whether the beams in any case are visible between a distant mountain, or a cloud, and the observer, and whether sounds accompany the meteor.

21. In going up the western coast it should be recollected that the magnetic needle has a large easterly variation increasing as we advance northward, care should therefore be taken to state, whether the register of the wind, arch of the Aurora, &c., is made in reference to the magnetic or true north, and to which the accounts of the directions of the wind you may obtain from others relates.

22. Note the appearance of water-spouts and the condition of the air as to temperature and moisture under which they occur; the direction of their motion, and whether they appear singly or in numbers. Observe whether the top spreads out with currents of air moving from it in every direction as if from a centre; and if the ship is near observe the effect on the barometer and whether the direction of the wind is then toward the spout.

23. Regular observations should be made on land when opportunities occur on all the objects mentioned in paragraph one. Enquiry should be made as to the occurrence of thunder storms; appearance of the aurora; amount of rain and snow; early and late frosts; as to whether cracks are produced during very cold weather in the earth by the shrinking of the surface; thickness of the ice in harbors; time of planting and reaping; of flowering of plants; leafing, &c., of trees; kinds and quality of grain, vegetables, &c., which are grown.

24. Observations should be made of the temperature of the ground at the depth of an inch, a foot, and a yard, the depth to

which frost extends, and in higher latitudes the depth to which the thawing reaches.

25. Observations on clear nights should be made as to radiation from the earth and the deposition of dew on glass, wood, wool, &c.

II. ETHNOLOGY.

1. As language affords one of the readiest, and perhaps the most certain mode of tracing affinity among the races of men, it is particularly desired to collect accurate vocabularies of a sufficient number of words in common use to make at any rate approximate comparisons. Fuller ones and grammars or partial grammatical forms should be obtained of course, when practicable, but as this is not likely to be the case during so short a voyage, such results as are attainable should be looked for. It is probable that Prince Maksoutoff in accordance with the example of his predecessors, Admirals Woewodsky and Furuhjelm, will aid in this by distributing the blanks furnished for the purpose to agents at the various ports of the Russo-American Fur Company. The most important tribes remaining are those extending from Copper river along the coast to Cape Fairweather, especially those known as Ugalentses and Galshanes. New vocabularies are however wanted of all the Eskimo tribes, including the Namollos of the Asiatic side of Behring Strait; of the Aleutians, the Kenaiens, and the Koloshians, in their various languages and dialects.

2. The collection of articles of indigenous manufacture or employment will, of course, form an object of particular interest, and should extend even to the most common and trivial. Drawings, or better still, photographs, should be made of dwellings, tombs, &c. Should a photographer accompany the expedition, it is most important that portraits of good size be taken of individuals of as many tribes as possible, less with the view of displaying their dress and ornaments than their features, form of the head, &c. A collection of skulls as far as possible, representing each tribe, should be made and in large numbers of specimens, particularly of the Eskimo nations, great care being taken to give locality and race.

III. NATURAL HISTORY.

1. It will of course be an object on the part of the Commission of the Treasury Department to illustrate the capabilities of Russian America in reference to its furs, fisheries, and forests, as well as its mineralogical and geological products. Understanding that the Coast Survey will take charge of matters pertaining to geological observations, we would call especial attention to the importance of securing full collections of all the animals known in the Russian American fur trade. Of these the most important is the sea otter, all the different recognized varieties of which should be procured, and of different ages, with, if possible, one or more skeletons. The black fox of the islands should be obtained for comparison with that of the mainland already in possession of the Smithsonian Institution. The different kinds of seals, especially the fur seal, of different ages, including very young and very old, and if possible a walrus of medium size should be secured; good specimens of the Rocky Mountain white goat with black horns, and of the Big-horn if it occurs, the bears, etc., will all be of interest and value. These skins should be obtained unutilated, and having the entire exterior preserved—head, with lips and ears, feet, tail, etc., that they may be mounted and set up. Skulls and if possible skeletons of all these animals will be desirable. Any species of mammals however will be of interest to the naturalist, including the mice, moles, bats, etc.

2. Among animals of economical value the different species of cetaceans, whales, porpoises, black fish, grampus, etc., are of course very prominent. Of the smaller, it is very desirable to have skins for stuffing; of any the skulls with the entire skeleton, if procurable will be useful, and especially so if a sketch of the animal in the flesh can be taken showing shape, proportions, and distribution of color between the upper and under surfaces. Very little is known of even the whales of the North Pacific, as to their true relationship with those of other parts of the world, and something of importance may be done in this connection by the Commission.

3. Among the Aleutian Islands is a great variety of sea-fowl, more or less unknown to the naturalist, and which will be of much interest. The most desirable of them are the small sea-

pigeons, dovekies, etc., some not larger than very young chickens. All the different kinds of these should be sought for and secured, as also the different kinds of cormorants, gulls, ducks and geese, and the land birds of the islands. Good collections of birds made at Sitka and in possession of the Smithsonian Institution render it less necessary to prosecute careful research into the ornithology of that Island; but Kodiak, Anaslaska, and the other Aleutians are almost entirely unknown in this connection and any collections will be of value.

4. Whenever the occasion offers, eggs of any species of bird breeding in Russian America should be secured, and the parent collected for identification.

5. Of the fishes it is desirable to secure good skins of large specimens of all the different food-species, as cod, halibut, salmon, sturgeon, etc., in order that they may be properly stuffed and placed on exhibition; the smaller kinds should also be represented as far as possible. The few species of reptiles occurring in the country should be carefully collected. Any specimens of shells, crabs, radiates, and other marine animals as well as the different orders of insects, will be of interest to the naturalist.

6. Specimens of the timber trees of the country should be secured, and sections with the bark on should be made to show the character of the wood. These should however always be accompanied by specimens of the foliage and fruit of the same tree to indicate its true botanical character together with an account of the extent and magnitude of the forest. Specimens of any other plants of known economical value should also be obtained. To the botanist, complete series of all plants of the different localities will be of much interest.

7. Full collections should be made of the rocks and minerals of the country at the different stopping points, as well as of any fossil remains that may be found to occur. Notes should accompany these specimens showing their relationship to each other and the country itself, and illustrated by diagrams indicating the number, inclination, and relative thickness of any strata that may be observed.

8. If the services of a competent naturalist can be procured in San Francisco, it will be of much importance and tend to add to the value of the information relative to the economical natural history of the country. An allowance too, will, probably have

to be made to meet expense of purchasing such furs as cannot otherwise be obtained, as sea otters, etc., as it is of great importance to be able to exhibit them to Congress. The magazines of the Russian American Company at Sitka, will probably contain nearly every kind of animal known in the fur trade.

9. In making any collections as suggested, care should be taken to attach a label or otherwise marking each specimen, so as to show the exact date and locality. Much of the value of these objects will be lost, unless such facts accompany them. Especial attention too, should be paid to their preparation and packing, so that they may not be injured or destroyed on the way back. If possible the skins of birds and animals should be sent home even before the return of the expedition in order that time may be allowed to have them properly prepared and mounted for exhibition. Any packages addressed to the Smithsonian Institution, care of the Pacific M. S. S. Co., San Francisco, will be forwarded free of expense.