with European birds, proved to be of that form. If, however, we do not recognize *Gavia arctica suschkini* as distinct, then the European bird is entitled to a place in our avifauna only on the strength of its casual occurrence in Alaska.

AN IMPROVED OBSERVATION TENT.

BY R. M. STRONG.

Plate X.

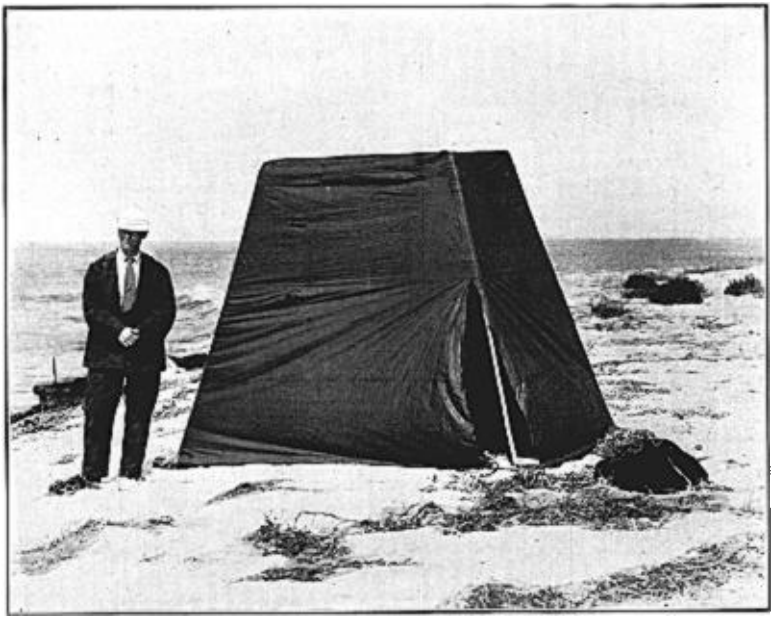
IN a preceding number[1] of this journal, I described with an illustration, a tent which I had used in studying gulls at their breeding places. This tent was a modification of a type described by Sawyer.[2] It is inexpensive and free from certain objectionable features of other bird blinds. However, it is small and low. Being only four feet high, one is not able to stand erect in it, and there is not sufficient space to handle apparatus comfortably. In the same communication, I stated that I had devised and used a larger tent since doing the work there described. It has occurred to me that an account of the improvements might be useful to some readers of this journal.

Tents of this type have no stay lines to interrupt the camera view, and they can be set up on rocky sites where it is not practicable to drive tent stakes. Furthermore, they are of very convenient shape, and are economical of ground space.

The contour of the tent is maintained by a frame which gives a flat horizontal roof and steep, slightly-sloping sides. The frame consists of eight poles held in position by four socket pieces at the corners of the roof and four anchoring poles to be described later. In the older tent, the frame poles were held together by blocks of

[1] Strong, R. M. On the Habits and Behavior of the Herring Gull, *Larus argentatus* Pont. The Auk, Vol. XXXI, Nos. 1–2, January–April, 1914. Plates III–X and XIX–XX, 1 text figure.

[2] Sawyer, E. J. A Special Bird-Blind. Bird Lore, Vol. XI, no. 2, March–April, 1909, pp. 71–73. One page of text figures.



1. CORNER BRACKET OF BRASS TUBING.
2. TENT IN POSITION, MUSKEGET ISLAND, AUG. 7, 1913.

wood in which holes were bored on three sides for the end, side, and upright poles. It has been my experience that these blocks are very unsatisfactory. Wear and shrinkage at the sockets make the fitting insecure, and a very small amount of looseness allows a large amount of sagging of the whole tent to leeward in a breeze. Furthermore, the blocks must be relatively large and clumsy to stand the strain put upon them, and they make a smooth fit of the cloth impossible. I found it necessary to brace the leeward side with sticks or boards which of course interfere seriously with the view and are often blown down by a strong wind.

I have been unable to get satisfactory poles for the tent frame in the vicinity of the places where I have used the tents. Furthermore, it requires more time to prepare poles properly than I have wished to spare after reaching a place for work. Since my first day in the field with a tent, I have always taken poles with me carefully prepared in advance.

In place of the clumsy wooden blocks, I had some brass corner pieces constructed. These consist of three short tubes brazed together (see Fig. 1), and lacquered black. These tubes have an inside diameter of 22 mm., and each is about 70 mm. long. One of these receives the end roof pole, another a side roof pole, and the third an upright supporting pole. The roof poles each make an angle of 103 degrees with the upright supporting pole. The angle of the two horizontal poles is of course 90 degrees. In place of the heavy hardwood, I have substituted bamboo poles. These are prepared from ordinary bamboo fish poles, selecting portions of suitable diameter. Brass ferrules were fitted on the ends of each roof pole and on the upper ends of each upright pole. These are necessary for a firm joint and were prepared at a hardware shop. A portion of such a ferrule projecting from a socket, appears in Fig. 1, at the right.

The tent proper was made from the same material used in my smaller tent, i. e. dark-green cambric or lining cloth which was purchased at 6 cts. a yard. About thirty yards 26 inches wide were used. I cut the cloth, pinning the sections together for the seamstress. The roof is in one section, which spreads slightly over the sides and ends of the tent. The angles were determined on cross section paper, and the material was cut into strips, three

to each side. The strips were sewed together with the seams parallel to the ground as may be seen in Fig. 2. When complete, the tent made a huge four cornered sack with two sides not sewed together half way from the bottom to the roof in order to provide an entrance, (see Fig. 2).

All of the seams were sewed twice, and the edges of all openings were hemmed. Tapes were sewed to the edges of the entrance for closing it. A deep hem was made at the bottom to hold bamboo anchoring poles which also served to hold the cloth in position. Openings were made in convenient positions for observation and camera work as may be seen in Fig. 2. These are closed by cloth doors which are fastened on the inside by hooks and eyes of the largest size. There is also an opening about six inches square, in the roof near one end, for ventilation. The whole outfit is packed into a long narrow box of suitable size and strength for transportation.

When the tent is to be set up, a site is chosen carefully with relation to the position of the sun at various times of the day, the direction of the wind, and of course the material to be studied The roof poles are first inserted in the corner sockets and then the uprights. After the frame is properly erected, the tent is slipped over it. A certain amount of latitude in locating the lower ends of the upright poles is permitted, and they are spread until the cloth is taut. The bottom anchoring poles are inserted and are anchored at their protruding ends with stakes or with rocks where stakes cannot be used. I have often used drift wood on a beach, instead of rocks.

After all outside work is done, I go inside with my equipment, *i. e.* cameras, etc., and arrange the interior. Even though a strong wind may not occur at the time, one may arise before the day's work is done, and it is wise to be prepared for a possible heavy strain upon the light tent frame, so reinforcing lines are arranged. Strong twine (shade cloth is good) must be used, and three lines are kept permanently tied to each corner piece. These lines are stretched under tension diagonally to screw eyes on the upright poles, so that they lie close to the cloth and do not cross any observation openings. One runs diagonally across the roof to the opposite corner piece. If the tension of all the lines is sufficient,

they help greatly in holding the tent in shape during a strong wind. In a stiff breeze, there is considerable bellying of the cloth on the windward side, but with so much space inside this is not serious.

The tent is six and one half feet high which accommodates most men in the erect position even with a hat. It is five and one half feet wide and seven feet long, at the ground. The four upright poles are six feet, eight inches long. The two end bottom poles are six feet long and the side bottom poles eight feet. The end roof poles are two feet six inches long, and the side roof poles are four feet long.

The usual method of entering the tent with a companion who may emerge at once and go away with any boat or vehicle used in transportation is always followed. I have never known this procedure to fail to deceive birds. They show vastly less concern than when there is no companion to leave the tent and the vicinity.

It is possible to see a good deal through the tent cloth without being visible from outside, and one may look through the openings rather freely without being noticed by birds. For a more complete discussion of the behavior of birds about a tent, and for various details in its use, the reader is referred to my paper on the behavior of the Herring Gull.

Professor Reighard of the University of Michigan spent two days with me in this tent during July, 1913, and he appears standing beside it in Fig. 2. This picture was made at Muskeget Island off the Massachusetts coast. We were comfortable and had abundant space for work. He has made some improvements in the line of portability which he has kindly described for me to publish with this account. The corner pieces are of aluminum and are made extra strong. The longer poles are provided with brass socket and ferrule joints so that no pole piece is over four feet long. He writes that "the whole outfit is compact and can be carried in a canvas bag with a handle like a valise."