emission. Such observations have become possible only through the introduction of the new Mark III VLBI system, which is five times more sensitive than its predecessor[3].

The galaxy studied in the first Mark III observations was the large spiral Messier 81 (M81). It has long been known that M81 has a compact nuclear radio source in its nucleus, on the basis of both variability[4] and a simple detection as a VLBI source[5]. More recently, it was found to have an optical spectrum similar to that of quasars[6] and a central X-ray source characteristic of quasars[7]. Since quasars and radio galaxies often show very linear jet-like radio structure[8], it was natural to chose M81 for study as soon as the Mark III VLBI system became available.

The first results of Bartel *et al.* show a clearly elongated structure in M81, about 6×10^{16} cm long and strikingly co-aligned with the apparent minor axis of the spiral galaxy as seen in the sky. This is what would be expected if the radio emission were showing a jet coming out of the galaxy perpendicular to the galaxy disk, although this is not a necessary deduction. The alignment would suggest that the tiny active nucleus (with a size only 10^{-6} that of the galaxy) 'knows' the rotation axis of the much larger object in which it is embedded. Some physical mechanism is needed to link these two different scales. One direct connection might be through the accreting material that is commonly thought to power the activity. If the material originates in the galaxy disk, then it will conserve its angular momentum vector as it spirals into the nucleus. With a sample of only one galaxy so far, however, it is not yet possible to know whether the alignment is real or is a random coincidence. On a larger scale (10^{21} cm) VLA data do not show any alignment for more powerful active nuclei in spirals[9].

The first Mark III data are only a beginning. Already the same group of astronomers has data in hand using many more telescopes to give more sensitivity and more baselines which will allow a real map of the M81 source to be constructed. (The current work had to rely on model fitting.) The extra sensitivity should allow an extension of the work to other, not quite so nearby, galaxies. Then we shall be able to discover whether the alignment is accidental or indicates a real link between the active nucleus and the parent galaxy.

Perhaps the most fascinating prospect in the near future is to repeat the observations at higher frequencies. By working at wavelengths as short as 1.3 cm the VLBI technique can map details three times as fine, which would correspond to 8×10^{15} cm in M81. This is not only the scale on which accretion disks should be found — if they exist in quasars — it also opens up the possibility of seeing motions in the nucleus on a time scale of a few years. Both rotation and expansion can be searched for. Optical work shows that mass motions of gas at speeds of 5,000 km s^{-1} exist in M81 (ref.6). If these motions relate to the radio source and were mainly in expansion, as some models predict[10], then changes in the source size should be detectable with high-frequency VLBI over a time span of 3–5 years. □

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100 years ago

THE ORNITHOLOGIST IN SIBERIA

THE ornithologists are certainly among the most enterprising of the seekers after truth. John Gould, the Birdman, is dead, but the same spirit which led him over the seas fifty years ago to investigate the then unknown Ornis of Australia still animates his brother bird-men. Mr. Henry Seebohm — a distinguished Member of the British Ornithologists' Union — has recently made two journeys into Northern Siberia, solely with the object of observing new forms and habits of bird-life and of collecting specimens. The scientific results of these expeditions have been published in the *Ibis* — the organ of the British Ornithologists' Union — which is now entering upon the twenty-fifth year of its existence.

The first of these two expeditions, to the lower valley of the Petchora, in North-Eastern Russia, was made by the author in 1875. For the second Mr. Seebohm left London on March 1, and travelled by rail to Nishni Novgorod, a distance of some 2,400 miles. Thence was a sledge-journey of about 3,200 miles miles to the winter quarters of the good ship *Thames*, on the Yenesay, or rather a little way up the Koorayika, an affluent of the Yenesay, on its right bank. The crew of the *Thames* who had passed a long and dreary winter, frozen up at this spot, were found on the travellers' arrival to be well and hearty, owing to the judicious precautions that had been taken by their Captain for the benefit of their health.

FIG. 3.—Driving with the ice on the Koorayika.

[FIG. 2.—Little Stint's nest, eggs, and young.

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