saving and banking at La Silla. Any service concerning data previous to that may lack of promptness due to a kind of chaos in former organization, but well-detailed requests could still be filled out. Two database packages are actually running at the computer centre for the direct CCD imagery from the Danish 1.54 m and the 2.2 m telescopes which allow fast disk access to these banks. Though the trend on handling images is to have them all in database, we lack of disk space, so far, to manage many data banks. On the other hand, the images along with the fast photometry have more than doubled the output from the telescopes in yearly terms, so that we deserve a little more computing power and much more space, I think.

Usually all data from the past night of an observer are entered and added to his copy tape. No "cleaning" of datafiles or purging files like Rasters, Sweeps and calibrations (SP files) are allowed as it was before (i.e. all data are saved as they come from the telescope). Careful track of the number of saved files follows up, paying attention to the date when observers change at each telescope. Each observer receives, on request, a magnetic tape copy of his data as well as any other computer service (print-outs, FITS (2) copies, etc. . . .).

Photometric Data

Rather than assuring telescope and instrument control, chief use of the computers nowadays, the first computers arriving on La Silla around 1972 were meant to acquire and handle photometric data. Astronomers used to spend much time patching and winding long streams of broken papertape in bare hands. I developed myself a great skill handling big rolls, even reading with the naked eye (not at the photoreader's speed, for sure) its data coded in holes, at telescopes first and within a damned cold dome later when the first computer centre on the mountain was born by 1974.

A photometer can be appended to almost every telescope on the mountain (exception made of the Schmidt, CAT and GPO), resulting in a big amount of photometric data acquired since the advent of astronomical observations at La Silla. No data banks are possible for photometric observations, due to a wide variety of photometric systems. All measures, except those in the infrared and the so-called fast photometry, are saved as individual banks under the observer's name and stored in cupboards by telescope. These small banks are, so far, using almost half of the total amount of magnetic tapes. I must stress that such a tape consumption is due to the ASCII format in which these data are recorded, thus making them easier to read.

Future Trends

Some experiments in data transmission via modem and microwaves were successfully carried out last June with direct images between a telescope at La Silla and a computer terminal at La Serena aiming at further remote control of telescopes and instruments from overseas in a near future; they might also be useful for remote data handling. One may expect these results to alleviate a bit the data banking on the mountain (sometimes ten telescopes are sending daily tapes to the computer centre). Yet I foresee a strong increase of output data because new telescopes will still be erected on the site.

Conclusion

We all at La Silla do our best to save the astronomical data and make them readily available for further use.

Software optimization of data banking, i.e. formatting, procedures, database packages, etc., will not reach a real efficiency in managing the forthcoming amount of data if we keep as mass data storage media the slowly accessed magnetic tapes.

Although we intend to make the few procedures described here as standardized as possible, something will always be left out, because the observing programmes, the acquisition systems, the handling environment, the human behaviour and astronomy itself are, as ever, dynamically unstable.

References

(1) Imbert, M., and Prévot, L., 1981, *The Messenger* **25,** 6.
(2) Wells, D.C., and Greisen, E.W., 1979, in *Image Processing in Astronomy,* Ed. G. Sedmak, M. Capaccioli, R.S. Allen, Osservatorio Astronomico di Trieste.

Two Bok Globules with Active Star Formation

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A number of studies of Bok globules have in the past few years been done at La Silla, mainly with a view to understand how such globules originate and what relation they have to the formation of stars. Bok globules are tiny, very dense, dark clouds composed mainly of molecules and dust, and they are cold rather quiescent structures. Recent work suggests that globules initially are formed as dense condensations, or cores, in large, less dense molecular clouds. The birth of massive OB stars in the neighbourhood of such a large cloud with the subsequent flood of ultraviolet radiation may seriously disrupt the cloud, stripping the cloud cores and leaving them after a compression as isolated Bok globules. In the process, stars may form in or at the edge of the globules. Studies of many southern globules from La Silla have revealed that quite a number of them are associated with various signposts of star formation, such as infrared sources, Hα emission stars or Herbig-Haro objects. Two rather spectacular cases are presented here.

The Horsehead: Birth of a Globule

One of the most famous objects in the sky, widely known from innumerable photos in books and magazines, is the Horsehead. In marked contrast to the celebrity of this object among amateur astronomers and laypersons, professional astronomers have payed it scant attention. However, this lack of interest is not well deserved, because, as it turns out, the Horsehead is in several ways a very remarkable object.

The Horsehead is a Bok globule which is just now in the process of appearing from a large parental dark cloud, known as L 1630. This cloud was once much larger, but the birth of a multiple trapezium-like system of luminous OB stars, σ Orionis

A–E, have had a major influence on the whole region. Today the front of the L 1630 cloud is receding, because the ultraviolet radiation from the young OB stars ionize the outer layers of the cloud, producing an H II region which expands and carries away the evaporated material. The much denser Horsehead was initially embedded as a cloud core in the L 1630 cloud. It is now being exposed and compressed, but because of its higher density it better withstands the eroding effects of the ultraviolet radiation.

Fig. 1 shows the Horsehead in a reproduction, specially processed by C. Madsen, ESO, of a Gascoigne plate taken by S. Laustsen with the 3.6 m telescope. The sharpness of the

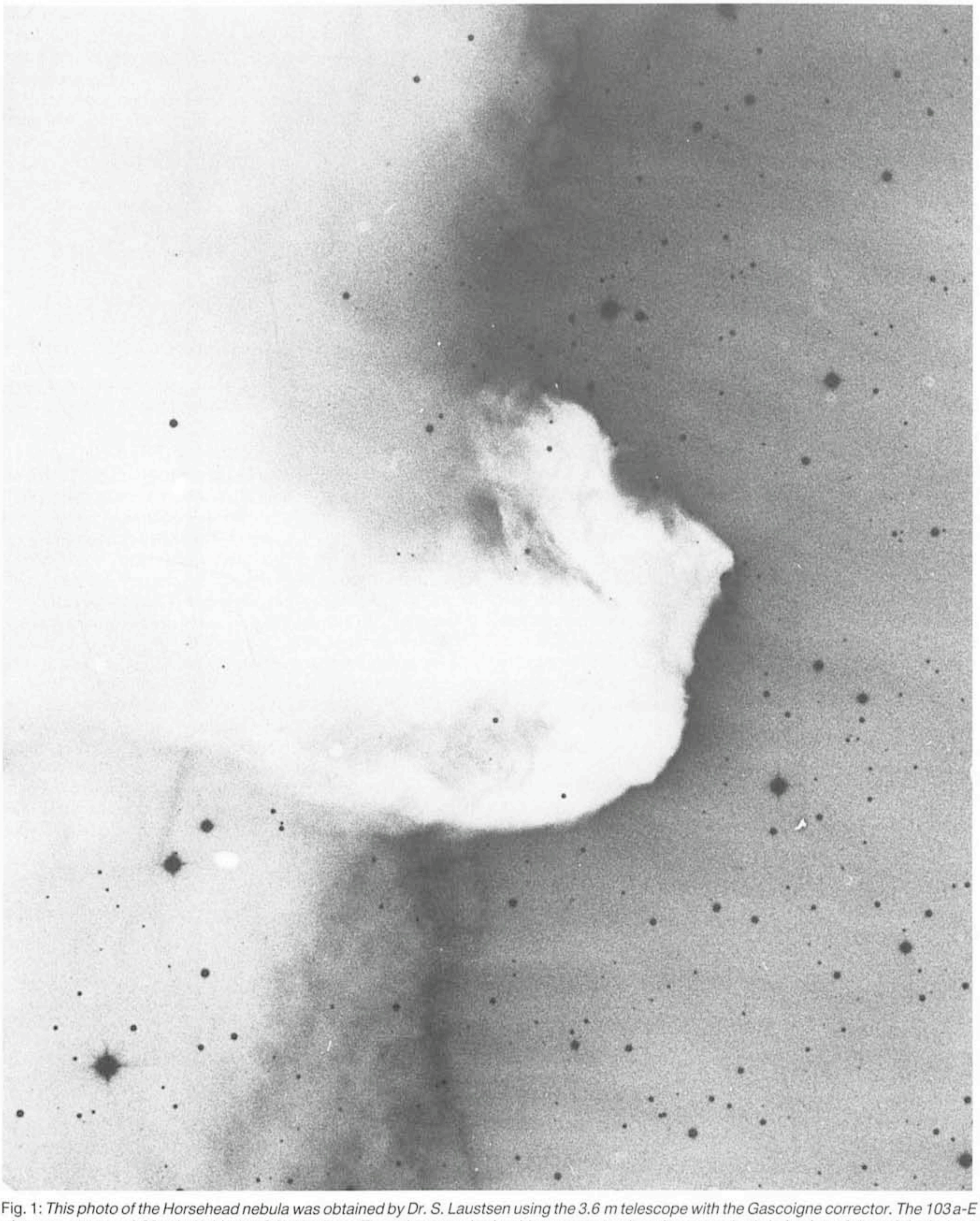

Fig. 1: *This photo of the Horsehead nebula was obtained by Dr. S. Laustsen using the 3.6 m telescope with the Gascoigne corrector. The 103a-E plate was exposed 60 min behind a GG 495 filter. The print was obtained by contrast enhancing a masked derivative of the original plate.*

right (western) side of the Horsehead is remarkable, and derives from the powerful influence of σ Orionis, which is far outside the right edge of the photo. What gives the Horsehead its name is mainly a luminous feature which forms the "jaw". Deep CCD images obtained with the Danish 1.5 m telescope at La Silla have revealed that the "jaw" is really a large flow-region, where matter is blown away from a newborn star in a highly collimated flow. Radio observations at millimetre wavelengths have in recent years revealed several regions of outflowing material around young stars, often aligned in two oppositely directed jets. A few optically visible jets have also been found, and the one in the Horsehead is a particularly fine example. The young star responsible for this activity can be seen in Fig. 1 at the base of the jet as an optically very faint star. P. Bouchet, ESO, has made near-infrared photometry of this star with the 3.6 m telescope at La Silla, and found it to be much brighter in the infrared than in visible light. The study of such violent phenomena in young stars is very new, and so far no consensus has been reached on the driving processes. However, there is some observational and theoretical evidence that a star recently born in the centre of a slowly rotating disk of molecular material may undergo eruptions when material from the disk accretes onto the star. During these violent flare-ups material may be driven away from the star and guided into oppositely directed jets by the surrounding disk. There could therefore, at least in principle, be a counter-jet in the Horsehead, burrowing into its denser regions, and thus not visible.

Another young star has been born in the Horsehead, in its upper right-hand (north-western) corner. Here a small nebulosity is visible, and CCD images have revealed a faint star half embedded at the bottom of a nebulous cavity. This star has also been observed in the infrared by P. Bouchet, who found it to be a bright infrared source. A few other regions in the Horsehead could also be due to newborn stars; one is a large indented cavity in the northern edge, another is around some structured reflection nebulosity in the southern part.

The Horsehead is thus a newborn Bok globule actively forming stars (probably of low mass), and it appears likely that this activity was triggered by the same processes which are presently excavating it from its parental cloud. Further optical and infrared data supplemented with millimetre observations are now being collected to study how widespread star formation is in this region.

NGC 5367: Demise of a Globule

A globule which has been excavated from a large dark cloud may sometimes be given only a short lease of life. This is so because the OB stars which liberate the globule may also contribute to its destruction. Firstly, the ultraviolet radiation bathing a globule makes a very hostile environment. Secondly, if star formation is triggered in the globule, winds and radiation from the young stars can make significant erosion. And thirdly, if one of the luminous OB stars in the neighbourhood is among the rare, very massive stars, it will after a rather brief evolution become a supernova, and any globules in the region will be run over by a blast wave.

NGC 5367 is a tiny cluster of nebulous stars embedded in the head of the very large cometary globule CG 12. This globule appears to have suffered from all the above-mentioned destructive forces, and may not live for very long. Fig. 2 is an enlargement, also specially processed by C. Madsen, ESO, from a deep ESO Schmidt plate taken by H.-E. Schuster. The globule itself is embedded in the dense bright rims in the front of the cometary object. The tail is about 10 pc long, and shows much structure, partly along the flow direction and partly around obstructions in the flow.

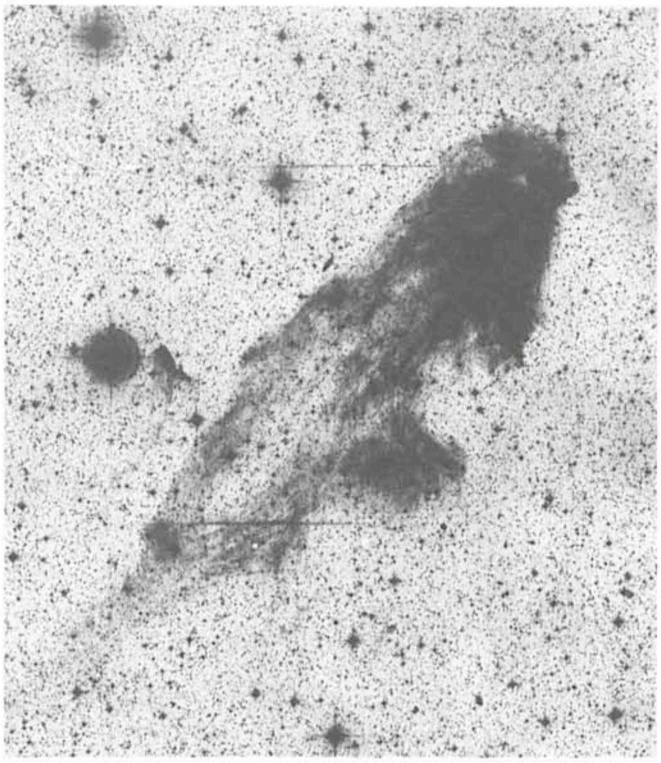

Fig. 2: *This photo of NGC 5367 was made by subjecting a standard ESO Schmidt plate (ERS 325) to diffuse light amplification.*

The stars in the globule have been studied by several authors, and lately optical and infrared photometry, IDS spectra and CCD images have been obtained at La Silla, and supplemented with IUE spectra. At least 6 stars are associated with the globule. Most prominent is the close visual binary Herschel 4636, consisting of two late B stars, one with and one without Hα emission. Three other late B and early A stars are associated with the globule, and an infrared source is embedded in the globule.

It is evident that some outside force has influenced the globule and caused the extraordinary tail structure. There are no obvious OB stars in the direction opposite the tail, but previous investigators found that there is an H I loop, towards the centre of which the globule is pointing. It appears that a very massive star has exploded as a supernova, and a shock wave has passed over the globule. The combined effects of first a luminous OB star, then a supernova explosion, and now a handful of embedded stars will most probably in the end lead to the destruction of the original globule.

The full details of the results mentioned here will appear in articles in *Astronomy and Astrophysics.*

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327. M.-H. Demoulin-Ulrich, H.R. Butcher and A. Boksenberg: Extended Gaseous Emission in Normal Elliptical Galaxies. *Astronomical Journal.* June 1984.
328. G. Gavazzi, M. Tarenghi, W. Jaffe, H. Butcher and A. Boksenberg: Radio and Optical Investigation of UGC 6697 in Abell 1367. *Astronomy and Astrophysics.* June 1984.