imize the efficiency of the system, a dispersion of 450 Å/mm was chosen. Not all the fibers have the same sensitivity, as shown in Figure 1, therefore fainter objects were assigned better fibers.

As a by-product of the observations, the absolute efficiency of OPTOPUS was derived. From the spectrophotometric calibration of some objects in the observed SA 94 fields it was possible to obtain the system response curve, which, compared with the one previously derived for the Boller & Chivens spectrograph in the normal slit configuration with the same grating and detector, provides the result of Figure 2.

4. Data Reduction

The reduction of OPTOPUS data is carried out very much in the same way used for slit spectra. Only the sky subtraction requires some additional care, especially at magnitudes fainter than B = 18.

An evaluation of the sky background corresponding to each fiber can be accomplished by offsetting the telescope about one arcmin away from the actual field (at high galactic latitudes the probability of getting another object in the aperture corresponding to the fiber is negligible) and exposing for a convenient time. However, it is well known that the sky emission is neither constant during the night, nor uniform all over the sky. A better estimate can then be obtained by combining different sky exposures taken during the night, say one at the middle and one at the end of the night, and using a few fibers to monitor the sky during the "object-exposure".

5. Results and Final Considerations

Sixty objects, down to B = 19.7 were observed in two fields during the December 1986 run. Seven of them turned out to be quasars; four are shown in Figure 3. The result is not at all disappointing, since the experiment mainly aimed at checking that no low-redshift quasars are missed by the usual UV excess criteria.

The performances of the instrument turned out to be better than expected: from these observations it appears possible to reach B = 20 with a spectral resolution of 25 Å and a S/N > 5, by taking two exposures of one hour for each field (in order to filter out cosmic rays) and properly subtracting the sky background as described above. At this limit, about ten quasars per template are expected. Using an efficient slit spectrograph like EFOSC, assuming a success rate of 50 per cent (required for an honest completeness) and 15 minutes exposure time per candidate, it would require about 5 hours of frantic work to do what can be accomplished in 3 hours of more relaxed OPTOPUS observations. Of course EFOSC allows much greater flexibility and OPTOPUS observations have to be carefully planned with large advance, nevertheless, the fiber-optics spectrograph offers a valuable possibility which should not be neglected by the observers.

An efficient aid in preparing observing proposals and runs, as well as the papers which follow:

SIMBAD, the CDS Database

A. HECK and D. EGRET, C.D.S., Observatoire Astronomique, Strasbourg, France

Preparing an Observing Proposal . . .

. . . has become an increasingly challenging exercise. With an ever higher pressure on space experiments and on large ground-based telescopes (and in particular those of ESO), it has become imperative to present extremely well-prepared documents to selection committees to get the observing time sought for.

In fact, scientists are now complaining that writing a good observing proposal requires as much time, care and energy as a paper for a refereed journal. The rationale has not only to be scientifically justified, but often a description of previous related work and of the methodology that shall be used for reducing and exploiting the data, have to be included. Reasons for additional and/or repeated observations have also to be explained. More and more frequently, combined or simultaneous (ground/space or multi-wavelength) observations are solicited and must be appropriately requested and subsequently organized.

These tasks are made much easier by a tool such as SIMBAD, a database providing all basic astronomical data available on the proposed targets, as well as the corresponding bibliography. More and more proposal writers are using it, as well as an increasing number of selection committee members.

The usefulness of SIMBAD does not stop at the writing of the proposals for observing time. The preparation of the observing runs themselves can also be greatly facilitated. Once these are completed, the reduction of the observations, their comparison with already published results and eventually the writing of new papers is significantly helped by getting the fundamental astronomical data and the relevant bibliography from SIMBAD. Never again should referees reject manuscripts for the reason of overlooked published papers!

Astronomical Quiz

It is no secret for the readers of this journal that practically every astronomical catalogue uses a different notation to designate the objects it gathers. In the past, this has already led a few times to the situation where two astronomers studied the same object under different identifiers without ever noticing it!

Most of us also remember the great difficulty of searching for various data spread over different catalogues for a sample of stars or even for a single star. The only common point between these catalogues was generally the appearance of the coordinates, often imprecise and relative to different epochs. Subsequently, how was an exhaustive survey of the papers relevant to the objects under study obtained? The available compilations were subject oriented, and when object designations were used as key words, generally no synonymity relations were provided.

The situation began to improve by the pioneering work undertaken in France at the beginning of the seventies by the astronomers of the Strasbourg Data Centre (CDS) and of a few collaborating institutions who started to establish, as modern Benedictines armed with computers, correspondences between the various catalogues. Since its foundation, CDS has maintained its clear leadership in the field of astronomical data banks.

A Little SIMBAD History

In 1972, the French National Institute of Astronomy and Geophysics (INAG, now the National Institute of the Sciences of the Universe – INSU) decided to create a *Centre de Données Stellaires* with the following aims:

- to compile the most important stellar data available in machine-readable form (positions, proper motions, magnitudes, spectra, parallaxes, colours, etc.),
- to improve them through critical evaluation and comparison,
- to distribute the results to the astronomical community, and
- to carry out its own research.

This centre has been installed at Strasbourg Observatory and is headed by a Director (presently C. Jaschek) who is responsible to a Council composed of six French and six foreign astronomers.

Besides collecting astrometric, photometric, spectroscopic and other catalogues, the first important accomplishment of the CDS has been to construct an enormous dictionary of stellar synonyms called the *Catalogue of Stellar Identifications* (CSI). Some stars have more than thirty different designations. This catalogue has been complemented by the *Bibliographical Star Index* (BSI) giving, for each star and from the major astronomical periodicals from 1950 onwards, the bibliographical references to the papers mentioning this star. On the average, a star is cited in five publications, but some stars are quoted in more than five hundred papers.

Taking advantage of the fact that, through the CSI, any identification can give access to all connected catalogues, and thus to their data, a user-friendly conversational software system has been built around it, leading to the present dynamic configuration of the SIMBAD *(Set of Identifications, Measurements and Bibliography for Astronomical Data)* base accessible from remote stations.

Subsequently, data on non-stellar galactic and extragalactic objects were included, together with their bibliographical references (from 1983 onwards). Taking account of this, and in order to retain well-known abbreviations like CDS, CSI and BSi, the word *stellar* appearing in them has been replaced by *Strasbourg*.

Some Basic Data on SIMBAD

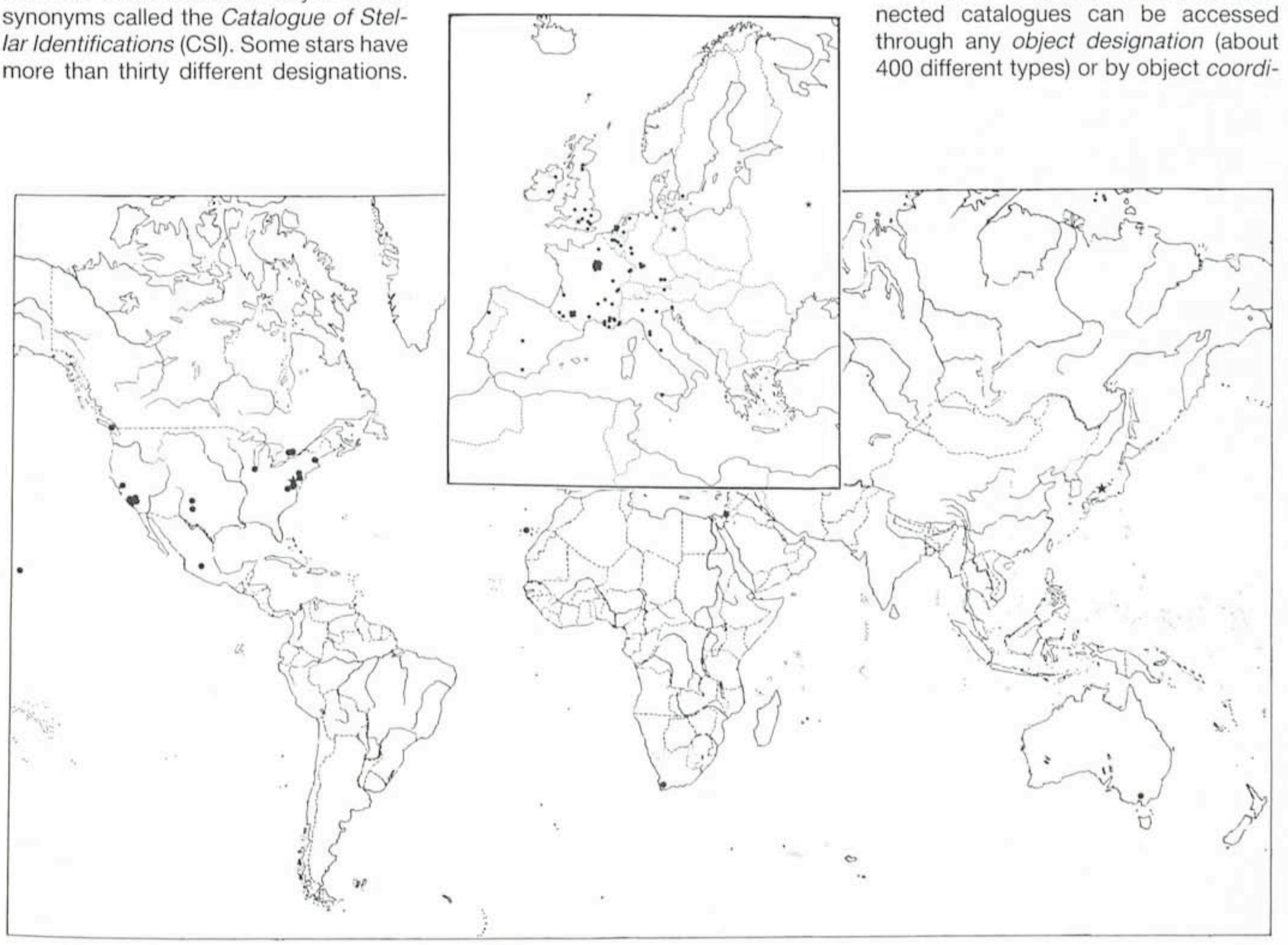
(April 1987)

700,000 Objects
100,000 non-stellar objects
2,000,000 cross-correlated identifications
1,000,000 on-line measurements
600,000 bibliographical object-indexed references from
90 astronomical periodicals scanned

Present Status

Thus SIMBAD represents much more than a mere accumulation of catalogues. Presently, it is most likely the largest base of basic astronomical data in the world. It contains about 700,000 objects including about 100,000 non-stellar objects (mostly galaxies) for which more than 2,000,000 identifications have been recorded. More than 1,000,000 measurements are provided on-line. These figures will be quickly out of date with the planned inclusion of the Guide Star Catalogue of the Hubble Space Telescope (of the order of 20 million objects).

The table of synonyms and the connected catalogues can be accessed through any *object designation* (about 400 different types) or by object *coordi-*



The maps (as of April 1987) represent the locations of SIMBAD user stations (•) in Europe and in the rest of the world. Collaborating data centres (★) are also indicated. The STARLINK centre at Rutherford Appleton Laboratory acts as a distributing node for its own network.

nates, equatorial, ecliptic (at any equinox) or galactic. In the latter mode, one may request to get all objects within a rectangle or a circle of given dimensions around a given position. *Criteria* can also be specified on parameters such as magnitude, existence of various types of data, etc. With this information, *maps* can be produced, making SIMBAD a precious auxiliary for creating identifying fields and preparing ground or space observing runs or programmes.

The bibliographic index contains references to stars from 1950 to 1983, and to all objects outside the solar system from 1983 onwards. Presently there are more than 600,000 references taken from the 90 most important astronomical periodical publications.

SIMBAD is accessible through *data networks,* including the French TELETEL public service. The European Space Agency (ESA) IUE Ground Observatory in Madrid was actually the first foreign station connected to SIMBAD which was used operationally for checking target coordinates and as an open service to visiting astronomers. It has been followed by other space centres like the Space Telescope Science Institute in Baltimore and NASA Goddard Space Flight Center in Greenbelt. The Space Telescope European Coordinating Facility in Garching is also connected through its host, the European Southern Observatory. Other stations with access to SIMBAD include places like the STARLINK node at Rutherford Appleton Laboratory, Caltech at Pasadena (CA), the Center for Astrophysics at Cambridge (MA), the Very Large Array in Socorro (NM), the Canada-France-Hawaï Telescope in Kamuela (HI), the Anglo-Australian Observatory in Epping, the South African Astronomical Observatory in Capetown, etc. (see maps).

To the present, there are more than a hundred centres in sixteen countries regularly interrogating SIMBAD. The figures are rapidly increasing. Apart from a simple terminal, the only requirement for accessing SIMBAD is obtaining an account number from CDS which will be used for invoicing. Astronomers without access to a data network can mail their requests to the Data Centre which will then return a printout with the corresponding data. In the same way, copies of individual catalogues (from a list of more than 500) can be obtained on magnetic tapes. Some of them (about 50) are also available on microfiche. Data transfer is also possible via the major computer networks.

SIMBAD is continuously growing and kept up-to-date, not only by the Strasbourg CDS staff, but also by many cooperating persons in other institutions. All the catalogues available at CDS have been produced by specialists, so that their high quality is guaranteed. Some catalogues, prepared at CDS itself and available as *CDS Special Publications,* are made in fields where the Strasbourg personnel has specific qualifications. Thus the *Catalogue of Stellar Groups* lists some 30,000 stars according to their spectral peculiarities.

Collaboration with other institutes having specialization in specific fields is then a natural consequence. This is particularly the case for Bordeaux, Meudon and Paris (bibliography), Geneva and Lausanne (photometry), Heidelberg (astrometry) and Marseille (radial velocities).

To encourage exchanges with other countries, *formal agreements* have been signed, in particular with NASA (USA), the Astronomical Council of the USSR Academy of Sciences and the Potsdam Zentralinstitut für Astrophysik (German Democratic Republic). CDS is also collaborating with Japan (Kanazawa Institute of Technology) and the United Kingdom (STARLINK). The goal of these agreements is to allow all astronomers in the world to have access to all existing catalogues.

Other CDS Activities

On a much larger scale, CDS takes also an active part in space projects like HIPPARCOS and TYCHO which are heavily dependent on SIMBAD for the preparation of their respective input catalogues. The Space Telescope GSSS team is collaborating with the CDS for the inclusion of the stellar cross identifications from SIMBAD in the *ST Guide Star Catalogue.* CDS acts also as the European disseminator of the IRAS observational material and has been requested by ESA to homogenize the IUE log of observations.

CDS plays a role also in the various discussions which should lead in the near future to the setting up of a *European astronomical data network.* Ideally, SIMBAD could be connected through such a network with the observing logs of the main ground and space observatories. Specific colloquia have been organized by CDS on this matter.

Apart from smaller scale CDS scientific meetings taking place twice per year, Strasbourg Observatory has organized several important colloquia on data collection, dissemination and analysis, as well as on statistical methods in astronomy. All these meetings were great successes and revealed the importance that the astronomical community attaches to this type of work.

Interest in CDS work is also shown by the growing number of astronomers visiting it, either to get to know the CDS or to set up a collaborative project. CDS stays in touch with its users and other interested persons by a six-monthly *Bulletin* distributed free of charge. Apart from keeping readers updated on CDS services and the latest developments, it contains also general papers and news about other data centres' activities.

In its Special Publication series, CDS also publishes *directories* gathering all practical data available on, on the one hand, astronomical associations and societies (IDAAS) and, on the other hand, institutions employing professional astronomers or researchers in astronomy (IDPAI).

The research activities of the scientific staff (currently eight persons) are essentially centred on statistical methodology and its applications to astrophysics, on classification problems, on distance and luminosity determinations, as well as on studies of peculiar objects.

Finally

If you want to have access to SIMBAD or, more generally, if you are interested in the CDS services, you can get in touch directly with us at:

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ESO Press Releases

The following Press Releases have been published since March 12, 1987, the date when *Messenger 47* was distributed.

PR 06/87: The Unusual Behavior of Supernova 1987 A in LMC (31 March); with colour photo of the supernova and the Tarantula Nebula.

PR 07/87: Important Events in the Southern Sky (14 May); with one B/W photo of Comet Wilson.

PR 08/87: ESO Exhibition at the Heysel Planetarium in Brussels (25 May).

PR 09/87: A New Edition of the ESO Publications and Picture Catalogue is now available from the ESO Information and Publication Service.

PR 09/87: Hunting the Black Hole (16 June), with one B/W photo.

PR 10/87: Is the Universe Younger than Previously Thought? (3 July)