number of exact positions, measured on this and other ESO plates, a preliminary orbit was computed. Interestingly, it turned out that the new minor planet had been observed before; in 1931 at the Flagstaff observatory in Arizona, USA. However, no orbit could be computed at that time and according to IAU rules, Eric Elst is therefore the official discoverer. When further observations had been secured in 1990, it was given the number (4636).

Discoverers of minor planets have the privilege to propose names for them, which are then scrutinized by an IAU Committee and authorized, if they conform with certain rules. Elst, who is a long-time visiting astronomer to ESO-La Silla, noted that no minor planet had ever been named after Chile and decided to name the new planet after this country. As is customary, he also wrote a short explanatory citation.

This is the citation for "Chile", as it appears on the Minor Planet Circulars 19697-19698 (1992 Feb. 18):

(4636) Chile = 1988 CJ5

Discovered 1988 Feb. 13 by E.W. Elst at the European Southern Observatory.

Named for the beautiful South American country in which the European Southern Observatory is located. Noted for its great wines, Chile is chiefly mountainous, with the Andes dominating the landscape. The extension of Chile across some 38 degrees of latitude embraces nearly all climates. The fascinating Chilean people are racially a mixture of Europeans (the conquistadores from Spain, Basque families) and indigenous tribes (Atacamenos, Diaguitas, Picunches, Araucanians, Huilliches, Pehuenches and Cuncos). Today the proud Araucanian Indians form the only significant ethnic minority.

"Chile" revolves around the Sun once every 4.23 years in a slightly eccentric orbit at a mean distance of 391 million km from the Sun, i.e. between the planets Mars and Jupiter. The orbital elements have been published in Minor Planet Circular 17192. The size is not yet known with certainty, but judging from the brightness, it may be estimated that the diameter is in the 10-km range.

Congratulations to our host country and to the discoverer! *The editor*

Another Chiron-type Object

R. M. West, ESO

The Discovery of 1992 AD

The announcement on January 23, 1992 (IAU Circular 5434) of a new "slow-moving" object in the solar system has been met with great enthusiasm by minor-planet and cometary astronomers alike. It was first found by Dave L. Rabinowitz at the 91-cm Spacewatch camera on January 9 and then observed with the Arizona-based telescope during the following nights. More observations were made by Eleanor Helin at Palomar and Robert McNaught at Siding Spring and when an earlier image was found on a January 1 Palomar plate, it became possible for Gary Williams of the IAU Minor Planet Bureau to compute the first, reasonably accurate orbit (IAUC 5435).

To everybody's surprise, *1992 AD* – as it was now baptized – turned out to have the most extreme orbit of all known minor planets: with a semi-major axis of 20.5 AU and an orbital eccentricity of 0.58, it reaches aphelion at 32.4 AU, i.e. beyond the orbit of Neptune! The orbital period is no less than 92.5 years, and the inclination is rather high, almost 25°. 1992 AD passed through its perihelion at a heliocentric distance of 8.7 AU in late September 1991, only half a year before the discovery. This corresponds to the orbit of Saturn.

After the discovery of (2060) Chiron in 1977, 1992 AD is only the second minor planet to have been found in an orbit that is almost entirely beyond that of Saturn. Its existence strengthens the belief held by some astronomers that there is a whole group of objects out there, waiting to be discovered with the more powerful observational techniques now becoming available.

The magnitude of 1992 AD was measured on January 9 as V = 16.9 and David Tholen at the NASA Infrared Telescope Facility on Mauna Kea (Hawaii) commented on the unusually red colour of the object. Preliminary values of the diameter and the albedo (ability to reflect the sunlight) were measured by a group of astronomers in Arizona, headed by E. Howell. Comparing infrared and visual observations, obtained simultaneously with the MMT and the 1.5-m Catalina telescopes, they found about 140 km and 0.08, respectively; the latter is not all that different from the presently accepted value for Chiron, about 0.10. Thus 1992 AD and Chiron resemble each other, at least what concerns these parameters.

Figure 1.

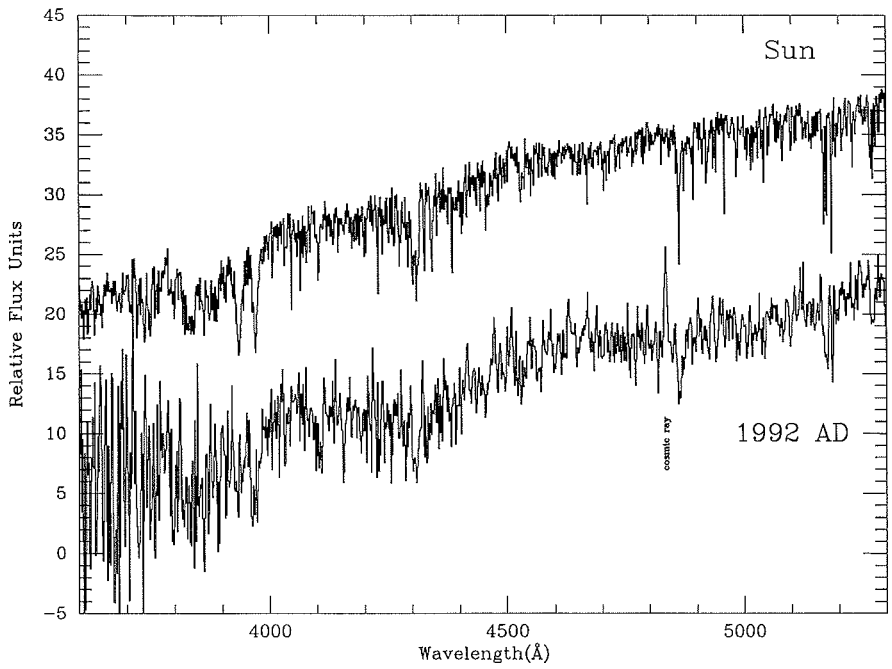

Figure 2.

ESO Observations

At ESO, three lines of investigations were initiated immediately after the announcement of the discovery.

With the Danish 1.54-m telescope, Olivier Hainaut and Alain Smette obtained deep CCD frames on February 2. In addition to measuring an accurate position, useful for improving the orbital computations, they checked whether 1992 AD has an atmosphere like is the case for Chiron since 1988. A 30-minute exposure is shown here (Fig. 1) and as can be seen, there is no sign of any diffuse "coma" around 1992 AD. In fact, by adding several CCD frames, the ESO astronomers were able to put quite low limits on any dust or gas above the surface of 1992 AD. It certainly looks completely inactive.

At the ESO/MPI 2.2-m telescope, Olivier Hainaut and Werner Zeilinger obtained a spectrum of 1992 AD, covering most of the visible region. A raw version of this spectrum is shown in Figure 2, together with the corresponding solar spectrum. Despite the rather poor response of the CCD in the UV-blue part of the spectrum, it seems clear that the overall forms of the spectra are similar, except that there may be some broad absorption structures in the spectrum of 1992 AD. No emission lines were found, so there is no indication of a gaseous atmosphere.

Thus, at least at the present time 1992 AD is dissimilar to Chiron in that it has no perceptible atmosphere.

Finally, a search was made for earlier images of 1992 AD, possibly visible on photographic plates available at the ESO Headquarters. Three ESO plates from 1977–78 and one UK Schmidt plate from 1982 were identified. A very faint trail was seen on the UKS plate.

However, when in February 1992 prediscovery images were found on Palomar plates dating from January 1991 and November 1989, a backward orbital extrapolation showed that the object on the 1982 UKS plate was not 1992 AD. But fortunately Robert McNaught from the UK Schmidt team in Coonabarabran found the right object, of magnitude ~ 20 and about 10 arcminutes distant from the other one, and he also identified 1992 AD on a 1977 UKS plate. A further verification of two ESO QBS plates from 1977 and 1978, now more accurate with the improved orbital data, still did not show the object, most certainly because the predicted blue magnitudes were 21.7 and 21.5, i.e. at the formal limiting magnitude of the ESO Quick Blue Survey.

The Importance of 1992 AD

The new minor planet moves in a part of the solar system that is largely unexplored. Only a few comets have been followed out to these distances, but the observations are very difficult and not very detailed. However 1992 AD and Chiron are bright enough to be observed over much of their orbits, especially when the new large telescopes enter into operation. They are most likely to represent the first (the brightest?) of a new class of minor planets which move in orbits beyond Saturn. Already at the time of the discovery of Chiron, it was inofficially decided that they will be given the names of mythological Centaurs, so they will supposedly be known in the future as the *Centaurs*, just like the Atens, Apollos, Amors, Hildas, etc. Now that 1992 AD has been observed in 1977, 1982, 1989, 1991 and 1992, the orbit is sufficiently well known to allow the assignment of a number and a name. No doubt the discoverers are now busy studying mythology!

In this connection, speculations have already been started about possible similarities between Chiron and 1992 AD on one side and some of the outer moons, like Triton at Neptune and Charon at Pluto, as well as Pluto itself. Are they perhaps all objects of the same basic type, but of different sizes and with different evolutionary histories? Only further observations will tell.

Nova Muscae 1991: One Year Later

M. DELLA VALLE, ESO-La Silla

X-ray novae form a subclass of low-mass X-ray binaries, which are systems usually composed of a low-mass late-type star and an accreting compact object as neutron star. For a few of them there exists the interesting possibility that the compact object may be a black hole. Thus the detection of the optical counterpart represents a first step towards the study of very compact objects in binary systems.

The X-ray transient source GRS 1121-68 was discovered by the WATCH all-sky X-ray monitor on the Soviet GRANAT satellite on January 9 (Lund and Brandt, 1991) and shortly thereafter by GINGA all-sky monitor (Makino, 1991). Its optical counterpart was furthermore identified as a star of V ~ 13.5 on a IIIa-J plate taken on January 13 with the 1-m Schmidt telescope (Della