参考译文：

阿伦德陨星

Sometime after midnight on February 8,1969, a large, bright meteor entered Earth's atmosphere and broke into thousands of pieces, plummeted to the ground, and scattered over an area 50 miles long and 10 miles wide in the state of Chihuahua in Mexico. The first meteorite from this fall was found in the village of Pueblito de Allende. Altogether, roughly two tons of meteorite fragments were recovered, all of which bear the name Allende for the location of the first discovery.

在 1969 年 2 月 8 日子夜后的某一时刻，一颗巨大的闪亮流星划破了地球的大气层，碎成无数的碎块坠落到地面，散布在墨西哥奇瓦瓦州境内长 50 英里宽 10英里的区域内。这次坠落为人们发现的第一块陨石是位于皮柏里托·德·阿伦德村。总共大约找到了 2 吨的陨星碎片，所有的碎片都是以首次发现的所在地阿伦德命名。

Individual specimens of Allende are covered with a black, glassy crust that formed when their exteriors melted as they were slowed by Earth's atmosphere. When broken open, Allende stones are revealed to contain an assortment of small, distinctive objects, spherical or irregular in shape and embedded in a dark gray matrix (binding material), which were once constituents of the solar nebula—the interstellar cloud of gas and dust out of which our solar system was formed.

每块阿伦德样本都覆盖着黑色的、玻璃样的熔壳，这层熔壳是在它们的外表面与地球大气层摩擦减速中熔化形成的。把阿伦德陨石破开发现里面含有各种各样细小的、与众不同的物体，这些物体球状或者不规则，嵌在深灰色的基质（结合物质）中，它们曾是太阳星云——形成我们的太阳系的由气体和尘埃组成的星级云团一部分。

The Allende meteorite is classified as a chondrite. Chondrites take their name from the Greek word chondros—meaning "seed"—an allusion to their appearance as rocks containing tiny seeds. These seeds are actually chondrules: millimeter-sized melted droplets of silicate material that were cooled into spheres of glass and crystal. A few chondrules contain grains that survived the melting event, so these enigmatic chondrules must have formed when compact masses of nebular dust were fused at high temperatures—approaching 1,700 degrees Celsius—and then cooled before these surviving grains could melt. Study of the textures of chondrules confirms that they cooled rather quickly, in times measured in minutes or hours, so the heating events that formed them must have been localized. It seems very unlikely that large portions of the nebula were heated to such extreme temperatures, and huge nebula areas could not possibly have lost heat so fast. Chondrules must have been melted in small pockets of the nebula that were able to lose heat rapidly. The origin of these peculiar glassy spheres remains an enigma.

阿伦德陨星属于球粒陨石。球粒陨石的名字是源于希腊语中的单词“chondros”，意思是种子，这是指它们的外观看起来仿佛是岩石中镶嵌着细小的种子。这些种子实际上是陨石球粒：毫米级的熔融硅酸盐物质小液滴冷却而成的玻璃球和水晶球。少数陨石球粒含有未遭熔化的颗粒，所以这些神秘的陨石球粒肯定是在接近1700 摄氏度的高温下熔化的星云尘埃致密团块中形成的，随后再这些团块在幸存的颗粒尚未熔化之前就冷却了。对陨石球粒质地的研究确认它们的确是以极快的速度冷却的，短则几分钟，长则数小时，所以形成陨石球粒的高温事件肯定是限于局部的。看起来极不可能是星云的大部分遭遇了如此极端的高温，大部分区域不可能很快的散热。陨石球粒肯定是在星云内部能够快速散热的小型袋状结构处被熔化的。这些奇特的玻璃球目前仍是未解之谜。

Equally perplexing constituents of Allende are the refractory inclusions: irregular white masses that tend to be larger than chondrules. They are composed of minerals uncommon on Earth, all rich in calcium, aluminum, and titanium, the most refractory (resistant to melting) of the major elements in the nebula. The same minerals that occur in refractory inclusions are believed to be the earliest-formed substances to have condensed out of the solar nebula. However, studies of the textures of inclusions reveal that the order in which the minerals appeared in the inclusions varies from inclusion to inclusion, and often does not match the theoretical condensation sequence for those metals.

同样令人困惑的是阿伦德陨星的成分是耐高温的内含物：比陨石球粒要大些的不规则的白色团块。它们是由地球上罕见的矿物质组成的，富含钙、铝以及在星云中最耐高温的（耐熔化的）主要元素钛。这些出现在耐高温内含物中的矿物质被认为是在太阳星云中最早凝结而成的物质。 然而，对内含物质地的研究发现不同的内含物中矿物质出现的顺序并不相同，往往与理论上这些金属的凝结序列不一致。

Chondrules and inclusions in Allende are held together by the chondrite matrix, a mixture of fine-grained, mostly silicate minerals that also includes grains of iron metal and iron sulfide. At one time it was thought that these matrix grains might be pristine nebular dust, the sort of stuff from which chondrules and inclusions were made. However, detailed studies of the chondrite matrix suggest that much of it, too, has been formed by condensation or melting in the nebula, although minute amounts of surviving interstellar dust are mixed with the processed materials.

阿伦德陨星里的陨石球粒和内含物是由球粒陨石基质结合到一起的，这是一种细粒混合物，主要是硅酸盐矿物，也包含铁颗粒和硫化亚铁。人们一度认为这些基质颗粒可能只含有星云尘埃，也就是形成陨石球粒和内含物的物质。不过对球粒陨石基质的详细研究表明多数基质的确是由星云的凝结和熔融形成的，但是在这些经过凝结和熔融的物质中还混有小部分残留的星际尘埃。

All these diverse constituents are aggregated together to form chondritic meteorites, like Allende, that have chemical compositions much like that of the Sun. To compare the compositions of a meteorite and the Sun, it is necessary that we use ratios of elements rather than simply the abundances of atoms. After all, the Sun has many more atoms of any element, say iron, than does a meteorite specimen, but the ratios of iron to silicon in the two kinds of matter might be comparable. The compositional similarity is striking. The major difference is that Allende is depleted in the most volatile elements, like hydrogen, carbon, oxygen, nitrogen, and the noble gases, relative to the Sun. These are the elements that tend to form gases even at very low temperatures. We might think of chondrites as samples of distilled Sun, a sort of solar sludge from which only gases have been removed. Since practically all the solar system's mass resides in the Sun, this similarity in chemistry means that chondrites have average solar system composition, except for the most volatile elements; they are truly lumps of nebular matter, probably similar in composition to the matter from which planets were assembled.

所有这些各种各样的组分被凝聚到一起形成了球粒陨石，就像与太阳具有很多相似化学组分的阿伦德陨星。为了比较陨星和太阳的组分，我们需要比较元素的比率，而不是简单的比较原子的丰度。毕竟，太阳含有的任何一种元素的原子数都要比一块陨星样品含有的多，但是两者间的铁和硅之比可能是具有可比性的。结果我们发现它们在组成上具有惊人的相似性。主要的差别是相比太阳，阿伦德陨星失去了大部分的挥发性元素，例如氢、碳、氧、氮以及惰性气体。这些元素即使是在很低的气温下也倾向于形成气体。我们或许会认为球粒陨石是“蒸馏后的太阳”的样本，有点像太阳除去了气体后的沉淀物。由于太阳系的质量几乎都集中于太阳，这种相似的化学组成意味着除了大部分的挥发性元素外，球粒陨石具有正常的太阳系组成，它们是真正星云物质的团块，很可能与形成行星的物质具有相似的组成。