the sojourn of the subject in the laboratory, the entire laboratory staff, with a corps of medical experts, was concentrated upon securing simultaneous observations with this subject. A large number of observations of a purely physiological nature were made, such as body-weight, insensible perspiration, temperature fluctuations, pulse-rate, blood pressure and certain observations on the mechanics of respiration. The gaseous metabolism and the alveolar air were also measured. The subject slept each night throughout the experiment for approximately 10 hours inside of the bed calorimeter. He was under surveillance constantly and it was therefore impossible for him to secure any food. As a result he lived entirely upon body substance, and chemical analyses, which included a study of the gaseous, solid and liquid excreta, gave most important data regarding the breaking down of the material inside the body, and the various components most strenuously attacked as a result of the fasting.

The subject was an ideal one, remaining very quiet. Comparisons of the metabolism and other factors during sleep and during waking were thus perfectly feasible for the first time, and showed the profound influence of sleep upon the metabolism. From the numerous experiments with both the respiration apparatus and the respiration calorimeter and a careful record of the daily activity, the total balance of income and outgo of this man for thirty-one days could be computed with great accuracy. The most important factors of metabolism measured on this subject are indicated on the accompanying chart.

Simultaneous with the physiological and chemical examination, an important psychological study showed that for thirty-one days the subject was able to exist in a fairly normal mental condition. A most rigid and careful clinical examination was made every other day and the subject was under the constant supervision of skilled physicians. All the resources of the laboratory were brought to bear upon this study and the whole project illustrates in the best manner possible the particular advantages of a laboratory of this type and the peculiar obligations of workers in the laboratory to undertake in so far as possible only those researches that can not be satisfactorily studied elsewhere.

FRANCIS G. BENEDICT

NEANDERTAL MAN IN SPAIN: THE LOWER JAW OF BAÑOLAS

IT is not generally realized that the first skeletal remains of what is now known as *Homo neandertalensis,* or Mousterian man, were found in Spain at Gibraltar in 1848. This preceded the discovery in the valley of the Neander by nine years. In many respects the Gibraltar skull is still one of the most important specimens of this type of early man. Although its distinctive characters were early recognized by both Falconer and Busk, the discovery of the man of Neandertal coming at a more opportune time was the first to win and hold the attention of the scientific world: hence for the name of that race we have *Homo neandertalensis* instead of *H. calpicus* (from Calfé, the old name for Gibraltar).

The history of the Gibraltar skull is almost paralleled by that of another discovery in Spain, not near Gibraltar but in the northeasternmost province, Gerona, near the eastern end of the Pyrenean chain of mountains. Some 23 km. north-northwest of Gerona, the capitol of the province of the same name, in the center of a depression lies the lake of Bañolas, now only a remnant of what it once was. Immediately to the east of the southern end of the lake is the town of Bañolas built on travertine beds left by the former greater lake. These rest on early Quaternary red clays and have been exploited extensively for building purposes. The quarry of Don Lorenzo Roura is near the northern limits of the

town in what is called "Llano de la Formiga." Here in April, 1887, he encountered a human lower jaw embedded in the hard travertine at a depth of from four to five meters. Fortunately Roura left the fragile jaw, almost complete, in its stone matrix and turned the block over to a Bañolas pharmacist, Don Pedro Alsius, who undertook the preparation of the specimen by the careful removal of the matrix from the bone. The relic is still in the private collection of Alsius, or rather of his family, for he died early in 1915. Although he published nothing concerning the specimen, Alsius recognized its archaic character. The first printed notice seems to have been that in "Anuari del Institut d'Estudis Catalans," Barcelona, 1909, by Professor Manuel Cazurro. Another note by Professor E. Harlé appeared in 1912 in the *Boletin del Instituto Geológico de España* (Madrid). Now comes an exhaustive study entitled "La Mandibula Neandertaloide de Bañolas," by Professors E. Hernandez-Pacheco and Hugo Obermaier.[1]

On account of its fragile character no attempt has been made to separate the lower jaw wholly from its matrix. Its inner surfaces are therefore not accessible. The outer surfaces including a full set of sixteen teeth are laid bare. The bone is of the same color as the matrix and highly fossilized. The right side is fairly well preserved. The condyloid process however is entirely gone. The anterior portion of the coronoid process is nearly complete; but its highest point can not be definitely fixed. A small piece is missing from the angle at the junction of the horizontal with the ascending ramus, but its negative is so well preserved by the tufa that the gonion can be determined with accuracy.

The left half of the jaw was broken in seven pieces when discovered. These have been successfully united. But owing to a very early break the whole left half is shoved outward and backward to a slight degree, a defect which can not be remedied. The left ascending ramus is not in so good a condition as the right. While the coronoid and condyloid processes are missing, the transverse diameter of the latter can be measured because of the tufa negative. Nearly the whole of the condyle lies inside the plane of the outer surface of the ascending ramus if extended, as is the case with the lower jaw of La Chapelle-aux-Saints.

The neck of the condyle is short; the coronoid process, low and blunt as seen in the nearly intact right ramus. The ascending branches are relatively low and broad. The body of the lower jaw is also low but robust. The chin is at least rudimentary if not wholly lacking; the angle of symphysis is 85°, placing the man of Bañolas in the same class with that of La Ferrassie. In some Neandertal examples the absence of chin is more pronounced and the angle of symphysis correspondingly greater as seen in the following table from Boule:

Recent man (individual variations)	57°	to 93°
Lower jaw of La Ferrassie	85°	
Lower jaw of *Bañolas*	85°	
Lower jaw of La Naulette	94°	
Lower jaw G and H of Krapina	99°	
Lower jaw of La Chapelle-aux-Saints.	104°	
Lower jaw of Mauer	105°	
Lower jaw of Malarnaud	105°	to 110°
Lower jaw of Spy	106°	to 111°
Lower jaw of the Gorilla	105°	
Lower jaw of the Chimpanzee	115°	
Lower jaw of the Orang	124°	

The lower jaw of Bañolas belonged to a male, who had reached the age of about forty years. Morphologically it falls within the Neandertal group, being the second discovery of this type in Spain. Unfortunately it was associated neither with other skeletal remains nor with artifacts. The travertine and the lower jaw itself are undoubtedly Pleistocene. If not so archaic as the Gibraltar skull, it might well be as old as the remains from La Ferrassie, which were associated with a typical Mousterian industry.

GEORGE GRANT MACCURDY

YALE UNIVERSITY,
NEW HAVEN, CONN.

[1] "Comisión de Investigaciones Paleontologicas y Préhistoricas," memoria numero 6, Madrid (Hipodromo), 1915.