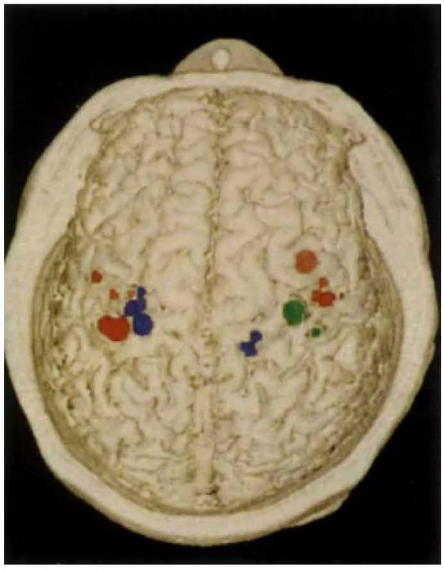

Top view of a combined MEG and three-dimensional surface-rendered MRI of patient F.A. The unaffected right hemisphere shows the primary somatosensory face area (red) lateral, anterior and inferior to the hand localizations (green), which are in turn lateral, anterior and inferior to the upper arm region (blue). The affected left hemisphere shows the face (red) and upper arm region (blue) extending into the expected hand territory.

a significant superior intrusion of facial localizations into the hand territory as compared with the controls ($P<0.02$). The affected hemisphere of F.A. exhibited superomedial intrusion of facial and inferolateral intrusion of upper arm localizations into the expected hand region (see figure). Compared with controls, a significant contraction of the distance between upper arm and facial localizations was seen on F.A.'s affected hemisphere ($P<0.01$). Comparison of mirror-image facial localizations on the affected versus unaffected hemispheres of D.S. and F.A. showed displacements of up to 35 and 30 mm, respectively.

Psychophysical testing revealed two maps of referred sensations in both amputees, one on the face and another on the upper arm, reflecting the fact that the hand area in the Penfield homunculus is flanked by the face and arm. Expansion of face and upper-arm representations into the cortical hand area would produce both the observed clustering of facial and upper-arm MEG localizations, and the clustering of points on the skin of the face and upper arm which yield referred sensations in the phantom hand.

These results provide the first direct demonstration of massive reorganization of sensory maps in the adult human brain[9], an observation which correlates well with physiological work on macaques[2] and psychophysical experiments on humans[3–5]. We conclude that new patterns of precisely organized and functionally effective connections can emerge in the adult human brain. Understanding these phenomena would have therapeutic implications, both for recovery from brain injury and for treatment of phantom limb pain.

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New mammals not so seldom

SIR — An item in *Nature*'s contents panel[1] suggests we should expect only "obscure microbes and insects" to turn up as new species and refers to the bovid *Pseudoryx nghetinhensis* as "the first large mammal to emerge since the kouprey" (named in 1937). In his News and Views comment, Henry Gee[2] claims the Chacoan peccary, not the kouprey, was "the latest and last large mammal to have been described." Dung *et al.*[3], in their paper naming *P.nghetrinhensis* in the same issue, say that it "has been more than 50 years since any comparable find of a large mammal species . . . the last being the kouprey." But during the period 1937 to the present, at least 16 large mammals have been discovered as living species, three of which also represented undescribed genera. Thus there have been about three new species of large mammals discovered per decade.

The species are[4]: two porpoises — *Lagenodelphis* (new genus) *hosei* (1956) and *Phocoena sinus* (1958); four beaked whales — *Tasmacetus* (new genus) *shepherdi* (1937), *Mesoplodon ginkgodens* (1958), *M. carlhubbsi* (1963), *M. peruvianus* (1991); a wild pig — *Sus heureni* (1987); the Chacoan peccary — *Catagonus wagneri* (named from bones from Indian mounds in 1930, present-day animals collected as early as 1936 (ref. 5), first reported as a living animal in 1975); four deer — *Mazama chunyi* (1959), *Moschus fuscus* (1981), *Muntiacus atherodes* (1982), *Muntiacus gongshanensis* (1990); the kouprey — *Bos sauveli* (1937); a gazelle — *Gazella bilkis* (1985); a wild sheep — *Pseudois schaeferi* (1963); and a 'bovid' — *Pseudoryx* (new genus) *nghetinhensis* (1993).

The first-mentioned porpoise, all four of the beaked whales, and the kouprey are much larger and heavier than *Pseudoryx nghetinhensis*[6]. The last 10 listed above are in the order Artiodactyla, and the last four are bovids. Not everyone necessarily agrees or will agree in future that all these animals deserve full specific status, but certain other large mammals (if any) named during this period and currently not treated as full species may come to be so regarded. The number named since 1937–1993 and that will be recognized at various times in the future will probably not deviate far from 16.

Varying time intervals can elapse between one or more specimens of a new species first becoming available, some knowledgeable scientist(s) seeing them, realization that the undescribed species exists, and eventual publication. As to the dates of these events, the year of publication of a new name is usually the best documented and therefore is treated here as the year of "discovery". In the case of *Gazella bilkis*, at least 116 years elapsed between the first specimen becoming available and publication of the new name[7]. In the case of *Tasmacetus shepherdi*, this interval appears to have been four years[8]; for *Bos sauveli*, seven[9]; for *Phocoena sinus*, eight[10]; for *Mesoplodon peruvianus*, fifteen[11].

Because most mammals are small, most now being named as new species are small. Since 1930, or 27% of the time (1758 to the present) that mammals have been scientifically named, there have been 742 recognized species of living mammals named[4]. This is 16% of the 4,629 species known (including some based only on subfossils)[4]. The numbers named per year for each decade are as follows: about 16 per year (1930s); 7 (1940s); 10 (1950s); 9 (1960s); 11 (1970s); and 16 (1980s). More than 46 have already been named in the 1990s. Thus there is no end in sight. These figures are remarkable in view of the supposed contemporary de-emphasis on "alpha" taxonomy in zoology and the undoubted accelerating extinction of species before discovery.

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