Corrections

IN THIS ISSUE
Correction for “In This Issue,” which appeared in issue 16, April 22, 2014, of Proc Natl Acad Sci USA (111:5755–5756; 10.1073/iti1614111).

The authors note that, due to a printer’s error, on page 5755, right column, first paragraph, line 2, “This preference is reflected in adult speakers’ more frequent misperceptions of lbif than blif in psychological experiments and in the prevalence of the former syllable type across languages” should instead appear as “This preference is reflected in adult speakers’ more frequent misperceptions of lbif than blif in psychological experiments and in the prevalence of the latter syllable type across languages.”

Additionally, on page 5756, right column, first full paragraph, line 13, “Differences in brain connectivity reflect a biological trait rather than a technical artifact, and may lead to revisions of the interpretations of imaging data in many neurodevelopmental, according to the authors” should instead appear as “Differences in brain connectivity reflect a biological trait rather than a technical artifact, and lead to revisions of the interpretations of imaging data in many neurodevelopmental studies, according to the authors.” The online version has been corrected.

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NEUROSCIENCE

The authors note that the reviewer name Patrick Edery should instead appear as Patrick Emery. The online version has been corrected.

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BIOCHEMISTRY, CHEMISTRY

The authors note that on page 5175, right column, second full paragraph, line 1 “A more complete mechanism can now be proposed for PhnZ. In the resting state, Y24 occupies the O2 binding site of Fe2 (Fig. 5). Upon binding the substrate (R)-2 at Fe2, E27 binds to the 2-amino group and triggers the release of Y24 from the active site. The expulsion of Y24 may also be promoted by an electron transfer from Fe1 to Fe2. This would allow O2 to bind at Fe2 and be reduced to form a Fe(III)-O2⁻ species, which subsequently abstracts the C1 hydrogen of (R)-2 to initiate CP bond cleavage (17).” should instead appear as “A more complete mechanism can now be proposed for PhnZ. In the resting state, Y24 occupies the O2 binding site of Fe1 (Fig. 5). Upon binding the substrate (R)-2 at Fe2, E27 binds to the 2-amino group and triggers the release of Y24 from the active site. The expulsion of Y24 may also be promoted by an electron transfer from Fe1 to Fe2. This would allow O2 to bind at Fe1 and be reduced to form a Fe(III)-O2⁻ species, which subsequently abstracts the C1 hydrogen of (R)-2 to initiate CP bond cleavage (17).”

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DEVELOPMENTAL BIOLOGY

The authors note that Fig. 3 appeared incorrectly. The corrected figure and its legend appear below.

Fig. 3. Transplantation of Muse cells and M-cluster formation from bone marrow. (A–E) Differentiation of GFP-labeled MEC population (H-fibroblasts) in damaged tissues of immunodeficient mice. (A) Cells locally injected into the edge of the excised region. Transplanted GFP(+) cells expressed cytokeratin 14 (red) in the regenerating epidermis (2 weeks). (B) Two weeks after i.v. injection, GFP(+) cells with central nuclei were seen in cardiotoxin-injected cutaneous muscle. Transplanted GFP(+) cells (arrow) and host cells [GFP(−), arrowhead] that expressed Pax7 were seen. (C) After 4 weeks, the GFP(+) muscle fibers expressed human dystrophin (h-Dystrophin; red). Four weeks after i.v. injection, most of the transplanted GFP(+) cells in liver with CCl4-induced damage were positive for human Golgi complex (D and E, white); some of them expressed human albumin (D, red) or human antitrypsin (E, red). (F–H) Formation of M-clusters from bone marrow-derived mononucleated cells. (F) M-clusters formed with 8-hr LTT (8-hr hBM-MC, day 7). (G) ALP(+) cells in 8-hr hBM-MC (day 7). (H) RT-PCR of naive H-MSCs (Naive 1 and Naive 2); M-clusters formed with 8-hr LTT (8-hr hBM) or without LTT [Naive hBM (N-hBM)]. Positive controls were human fetus liver (Liver) for α-fetoprotein (α-FP) and whole human embryo (Embryo) for GATA6, MAP-2, and Nkx2.5. (Scale bars: A, B, E, F, and G, 50 μm; C and D, 100 μm.)

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In This Issue

Atmospheric processes affecting nitrogen isotopes
Records of past atmospheric composition that are preserved in remote lake sediments and ice cores show a decline in the ratio of stable nitrogen isotopes since 1850. Researchers previously considered the isotope ratio as an indicator of atmospheric nitrate sources and attributed the decrease to an influx of anthropogenic nitrate into the atmosphere, yet increases in atmospheric nitrate over time do not always accompany decreases in the nitrogen isotope ratio. Lei Geng et al. (pp. 5808–5812) compared nitrogen isotope trends with long-term trends in atmospheric acidity along with concentrations of nitrate and sulfate. The authors report that isotope ratios corresponded most closely with atmospheric acidity levels associated with the abundance of sulfuric and nitric acids, suggesting that correlations between nitrogen isotopes and nitrate may be due to independent processes. Increased atmospheric acidity likely resulted in elevated atmospheric nitrate in its gaseous form, which is depleted in the nitrogen-15 isotope. Isotope ratio trends leveled off around 1970, the authors report, likely due to air pollution mitigation measures that also affected atmospheric concentrations of nitrate and sulfate. The results suggest that studies using nitrogen isotopes as an indicator of changes in the nitrogen budget should take into account atmospheric processes that may alter the ratio, according to the authors. — P.G.

Innate responses to syllable structure
Regardless of language, people perceive syllables such as blif more easily than syllables such as lbif. This preference is reflected in adult speakers’ more frequent misperceptions of lbif than blif in psychological experiments and in the prevalence of the latter syllable type across languages. To determine whether preferred syllable structures are shaped by cultural processes or by innate linguistic constraints, David Gómez et al. (pp. 5837–5841) played recordings of a native Russian speaker pronouncing various syllable types to 72 newborns between 2 and 5 days of age. The authors monitored the newborns’ brain activity during the experiment using near-infrared spectroscopy, measuring the oxygen flow to the temporal lobe and perisylvian areas in both hemispheres. The authors report that the newborns’ left hemispheres were critically involved during the experiment, consistent with previous research suggesting that newborns process speech in the brain’s left hemisphere. Further, oxyhemoglobin concentrations in the newborns’ left temporal lobe and perisylvian areas were lower during playback of preferred syllables such as blif than during playback of dispreferred syllables such as lbif or bdif, suggesting that the babies’ brains distinguished between the two syllable types. The parallels between newborns’ range of responses to syllable structure and adults’ linguistic preferences suggest that lifelong phonological preferences are present at birth, according to the authors. — P.G.

Erbin and cardiac hypertrophy
During normal development, the heart expands by increasing the size of cells called cardiomyocytes. Excessive growth, termed cardiac hypertrophy, accompanies many forms of cardiac disease and can lead to heart failure; the tyrosine kinase receptor ErbB2/Her2 protects against pathological hypertrophy. Inbal Rachmin et al. (pp. 5902–5907) investigated the role of the ErbB2 interacting protein, Erbin, in both normal and hypertrophic heart function. When the authors induced cardiac hypertrophy using different methods, Erbin expression in the mouse heart was decreased. Patients with end-stage heart failure also had reduced levels of Erbin in their hearts. In
mice lacking Erbin, heart function largely appeared normal under basal conditions. However, Erbin knockout mice demonstrated an exaggerated response to induced hypertrophy, compared with control mice, as assessed by echocardiography, along with increases in cardiomyocyte diameter, heart size, and fibrosis. Aortic constriction, a technique used to induce hypertrophy, caused mortality in 37% of wild-type mice but 100% of Erbin knockout mice. Following β-adrenergic stimulation, an alternative technique for hypertrophy, Erbin knockout mice demonstrated increased phosphorylation of a mediator of cardiac hypertrophy, relative to wild-type mice. The results suggest that the absence of Erbin disrupts temporal control of hypertrophy, according to the authors. — C.B.

Twin study examines how genetics influences adaptive immune system

The adaptive immune system protects humans from infection partly through the action of hypervariable receptor molecules on the surface of B and T cells that can recognize and target invading pathogens. In every individual, the receptor molecules reflect individual genetic traits augmented by environmental factors, including all possible self and foreign antigens. To assess how genetics influences the formation of adaptive immunity, Ivan Zvyagin et al. (pp. 5980–5985) used next generation sequencing to analyze TCR repertoires of three pairs of monozygous (MZ) twins. The authors found that the overlap between general TCR repertoires in MZ twins is very similar to the overlap between nonrelated individuals, an unexpected finding given that all genes, including those that form the TCR repertoire, are identical in MZ twins. However, twin TCR repertoires share certain features, the authors report, particularly in the third complementarity determining region, which is crucial to antigen specificity. The authors also show that individual genetic makeup determines the recruitment of certain TCR genes for recombination and subsequent selection in the thymus, the immune system organ in which T cells mature. — T.J.

Evolutionary pressure to jockey for position in a microbial community

Microbes form structured communities that influence their role as gut symbionts, infectious agents, and bioremediation or biofouling agents. Wook Kim et al. (pp. E1639–E1647) tracked the evolution of the soil bacterium Pseudomonas fluorescens in laboratory colonies to understand how microbes compete in structured communities. The authors observed that P. fluorescens mucoid variants, mutant cells that produce multiple secretions, repeatedly arose in the colonies and ultimately grew to cover the colony surface. The mucoid variants did not grow faster than wild-type cells when the two strains were grown separately, suggesting that the secretions did not affect growth rate. Instead, microscopy and modeling techniques suggested that the secretions enable cells to push their way through and out of the colony to gain greater access to oxygen and outcompete neighboring nonmucoid cells. Genome sequencing revealed that all mucoid variants had undergone a mutation in a single gene, rsmE, resulting in increased secretion levels and a competitive growth advantage. Examination of more than 500 different mutations in rsmE revealed differences in the competitive phenotype that could be tied to the molecular effects of each mutation. According to the authors, microbes compete to reach community edges where nutrients are plentiful, similar to plants that grow tall to compete for light. — J.P.J.