News from here and there

New shape of epithelial cell discovered: 'Scutoid'

Generations of students have been taught about the basic shapes of epithelial cells— squamous, cuboid, columnar, ciliated and transitional. Researchers have now discovered a new geometric shape of epithelial cells—scutoid. On 27 July 2018, scientists from the University of Seville, Spain and Lehigh University, USA published this fascinating finding in *Nature Communications* (2018;**9:**2960).

Javier Buceta, one of the scientists on the research group, explained in an email that 'scutoid is not actually a shape but a family of shapes'. The shape has been named so, after its stunning resemblance with the scutellum/scutum of *Protaetia* species beetle of the Cetoniidae family. It is like a prism which can have 5, 6, 7, 8 or more sides with a zipper on one of the edges connecting the superior and inferior surface. When the zipper is pulled up to the middle of the edge, a tent-like triangular area remains on one side. As a result of which one of the faces, either the top or the bottom has one side more than the other (Fig. 1).

The research aimed to determine how epithelial cells tessellate on 3-dimensional, curved surfaces without leaving gaps and how they change shape when tissues undergo bending. Dr Bucetta shared that 'this research in particular has been the result of 3 years of work but the different members of the research team have been working for many years in these topics of cell geometry and biophysics to arrive to this point.' He explained, in his email as well as in the article, that first their team developed computational models based on the Voronoi principle (commonly used in architecture) aimed at simulating the packing of cells in tissues subjected to bending. The computer models developed a shape (now named as 'scutoid'), which was then tested on Drosophila larval salivary glands, Drosophila embryos in gastrulation phase, Drosophila egg chambers and zebrafish embryos. The study showed that cells in curved epithelium of these organisms undergo intercalations along the apico-basal axis to assume the scutoid shape. According to Buceta, this shape 'allows the cells to minimize the line tension and equilibrate the forces. Thus, it is a more efficient way of packing.' Cells in curved epithelia assume this shape as it utilizes minimal energy and gives stable 3D packing. When asked if the cells undergo shape change during movements such as extension of the wrist from a state of flexion, he responded affirmatively commenting that whenever tissues are subjected to active remodelling, scutoids are dynamically created. Elaborating on the significance of this discovery to medicine he stated that as the future of tissue engineering depends on developing scaffolds for cells, this shape assumes significance as it opens doors to create scaffolds with right cellular geometry given the properties of the particular tissue. However, the team at the moment does not know what the expected shape of cells would be for a particular tissue and state that it is a matter of further research.

He added: 'It is difficult to describe with words the feeling you get when you realize that you have uncovered a "secret" from nature. Happiness could be a way to describe it but it is an ineffable feeling really.' The team is trying to explore what could be the possible molecules that enable cells to assume such a shape. When questioned about their future plans, he concluded by stating: 'We have many ideas to continue this research, starting with understanding better the characterization of these shapes, their energy, the biological implications for cell–cell communication … we are working on them as we speak.'

The scutoid cell explains how cells packed in an epithelium change shape during bending or growth or movements—not too dissimilar to a danseuse making her fine movements or a gymnast's somersaults.

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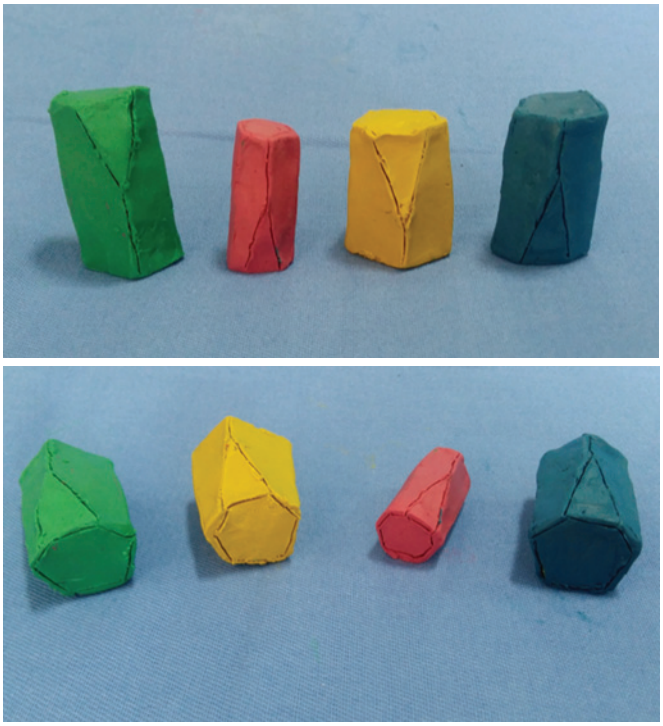

FIG 1. Clay models showing the 3-dimensional structure of scutoids

Numbers of government hospitals and hospital beds in India announced

On 2 separate occasions, in July and August 2018, the Rajya Sabha was informed, in a written reply, about the data on hospital beds in India by the Minister of State for Health and Family Welfare. As of 31 March 2017, there were 156 231 subcentres, 25 650 primary health centres (PHCs) and 5624 community health centres (CHCs). Uttar Pradesh, as expected, being the largest state, has the most numbers in all categories: 20 521, 3621 and 822, respectively. The total number of doctors at PHCs were 27 124 and the total number of specialists at CHCs

were 4156. The total number of nursing staff was 70 738. Of the PHCs, 446 were in a public–private partnership (PPP) mode.

There were 739 024 beds in the 37 725 facilities, which included PHCs, CHCs, subdistrict and district hospitals (up to 1 January 2017, data available for most states). There were 3943 AYUSH hospitals with 55 242 beds (up to 1 April 2017). The number of hospitals and beds for certain other organizations (data from 2017–18) were 126 and 13 748 (Railways), 133 and 34 520 (Defence) and 151 and 19 765 (Employees' State Insurance Corporation).

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National programme initiated on diabetes mellitus in India

According to the International Diabetes Federation (IDF) Diabetes Atlas (8th edition; *www.diabetesatlas.org/across-the-globe.html*), in 2017, India had the second largest number of persons aged 20–79 years with diabetes mellitus in the world (about 73 million), with only China (114 millions) having more people with diabetes. The National Family Health Survey (NFHS-4), 2015–16 (*http://rchiips.org/nfhs/pdf/NFHS4/India.pdf*) documents that 5.8% of women and 8.0% of men and 2.8% of women and 3.9% of men in the age group of 15–49 years in India had high (defined as >140 mg/dl) and very high (defined as >160 mg/dl) blood sugar levels.

To address the growing problem of non-communicable diseases (NCDs), including diabetes mellitus, the Government of India has initiated a programme, termed the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) under the National Health Mission (NHM). The NPCDCS, will set up NCD clinics in district hospitals as well as community health centres. These will offer diagnostic services as well as treatment for patients with diabetes mellitus. The NPCDCS will focus on spreading awareness about lifestyle changes that are necessary to tackle the diseases, as well as on screening and on early diagnosis in those who have risk factors, and will contribute to ensure the institution of treatment or referral to a superior centre for appropriate management, if need be. The treatment is provided either free or will be considerably subsidized for people who fall into the 'below poverty line' bracket.

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