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Research Article

The Pictorial Glossary of Fancy terminologies in Cytopathology

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ABSTRACT

Pictorial glossary is the best way for the residents to understand the subject of Cytopathology. Certain terminologies and their etymology is sometimes necessary for better retention and their reproducibility

Key Words: *Cytopathology; Fancy terminologies; Pictorial glossary; Robin's egg blue; Honeycomb; Tadpole cell*

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INTRODUCTION

Pictorial glossary is a collection of certain important terminologies along with their photographs. This article illustrates few important terms commonly used in the field of Cytopathology along with their etymology. The best way to learn Pathology is by illustrations and best way to retain is by Pictorial representations.

1) Robin's egg blue cytoplasm

Seen in **Squamous Cell Carcinoma (SCC)** on Romanowsky stains.

The blue colour in robin eggs is due to **biliverdin**, a pigment deposited on the eggshell when the female lays the eggs **[Fig1A].**

The cytoplasm of malignant Squamous cells is **pale blue** often termed as **Robin's egg blue cytoplasm** as **keratinization** appears pale blue on **Romanowski stains[Fig1B]**, whereas on PAP stain it appears pink-orange [1,2].

Fig 1A – Robin's egg

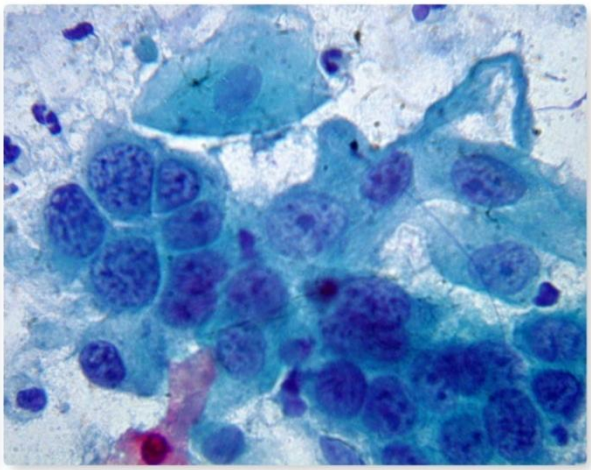


Fig 1B – Robin's egg blue cytoplasm

2) Tadpole cell / Caudate cell

Seen in **SCC**.

Tadpole is a larval stage in the life cycle of many amphibians having a characteristic appearance of a round head and a tail**[Fig 2A]**.

A **tadpole cell**(larger cytoplasmic body with a **long tail**) is typically seen in squamous cell carcinoma due to property of malignant squamous cells to exfoliate or dissociate probably due to loss of **E-cadherin[Fig 2B]**.
They are better appreciated on PAP stain [1,2,3].

Fig 2A – Tadpole larva

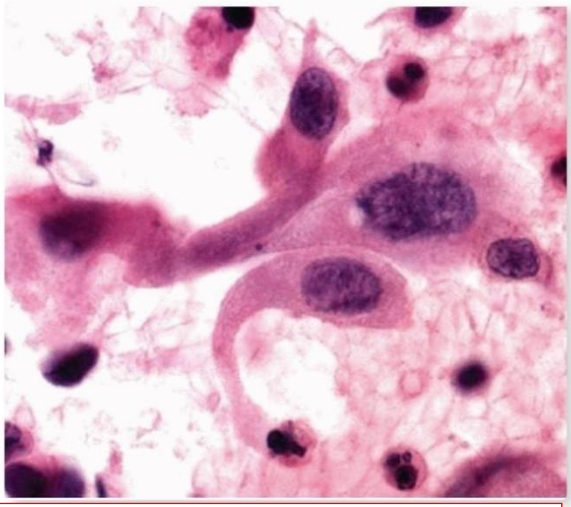


Fig 2B – Tadpole cell

3) Fiber Cell

Seen in **SCC.**

A **fiber cell** is an **elongated, spindle shaped cell** with a central cytoplasmic body and **bipolar extension of cytoplasm** typically seen in squamous cell carcinoma**[Fig 3A-B]**.

Fig 3A – Fibres

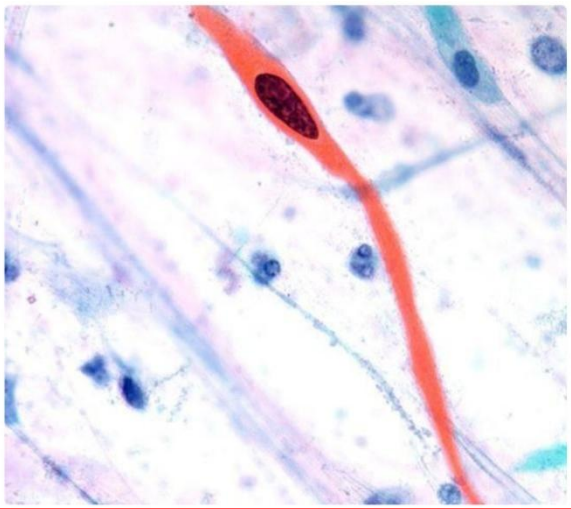


Fig 3B – Fiber cell

4) Idaho Potato chromatin

Seen in **SCC**

Idaho is a state in U.S. and its famous for the potatoes grown there. It has typical appearance with **eyes and pits** on the surface**[Fig 4A]**.

The chromatin is **coarsely textured** and resembles the **mottled and pitted** surface of an Idaho potato**[Fig 4B]**[3].

Fig 4A – Idaho Potato

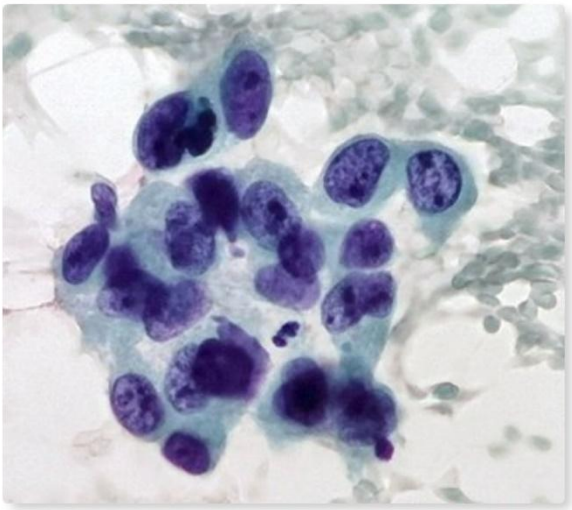


Fig 4B – Idaho Potato chromatin

5) Keratin Pearl / Epithelial Pearl

Seen in **keratinizing SCC**

Atypical squamous cells form **concentric layers** showing gradual keratinization. Due to lack of cohesion among malignant squamous cells the accumulate in form of **concentric rings [Fig 5A-B]**[2].

Fig 5A – Pearls in a chain

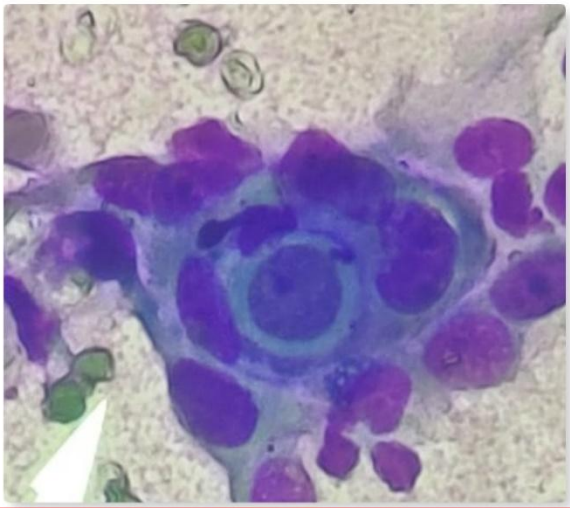


Fig 5B – Squamous pearl

6) Honeycomb/Picket fence appearance

Seen in Cervical Cytology in **Endocervical cells on Pap smear**

En face view of endocervical cell shows **honeycomb** architecture whereas **side view** shows a **picket fence** view**[Fig 6A-D]**[4].

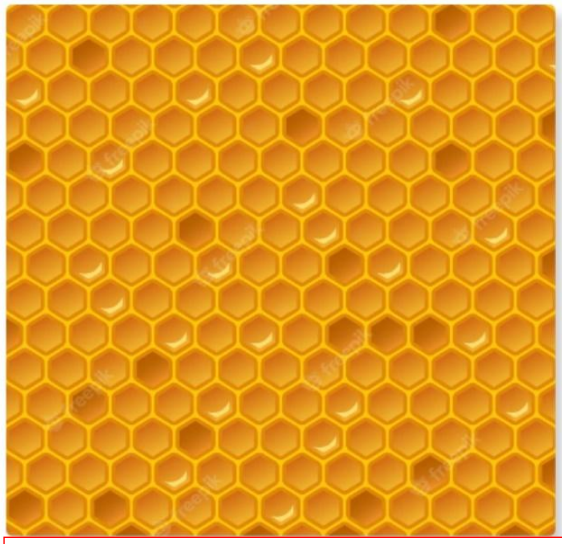


Fig 6A – Honeycomb architecture

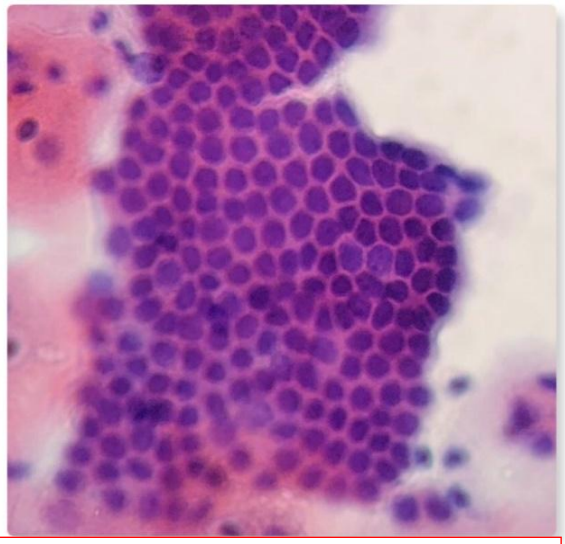


Fig 6B – Endocervical cells in honeycomb pattern

Fig 6C – Picket fence

Fig 6D – Endocervical cells in Picket fence pattern

7) 'Shish kebab' effect

Seen in cervical cytology in Candidal infection [5].

Shish kebab is Turkish meal typically consists of meat and vegetables on a skewer**[Fig 7A]**.

Intermediate squamous cells('kebabs') may clump together around these **filamentous organisms('shish')**which may produce a **"speared"** appearance of squamous epithelial cells with pseudohyphae**[Fig 7B]**[4,6,7].

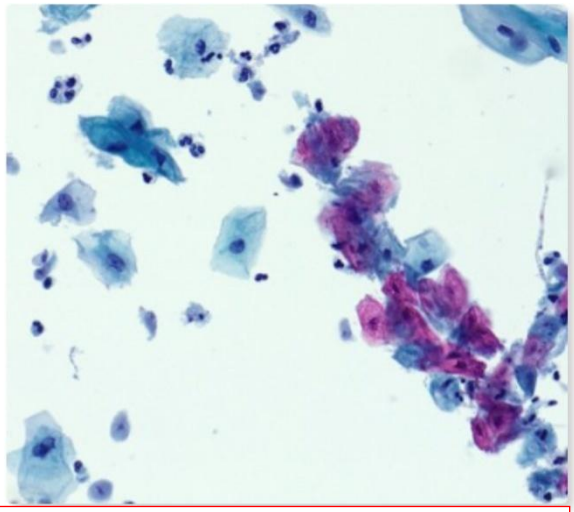


Fig 7A – Kebab around a Shish Fig 7B – Shish Kebab effect

8) Clue cells

Seen in **Cervical Cytology in Bacterial Vaginosis**.

Clue cells are squamous epithelial cells covered by adherent gram-negative **cocci** or **cocco-bacilli**, which gives it a characteristic appearance of having **grainy border [Fig 8].**

Most common bacteria associated with this condition is **Gardnerellavaginalis**[7].

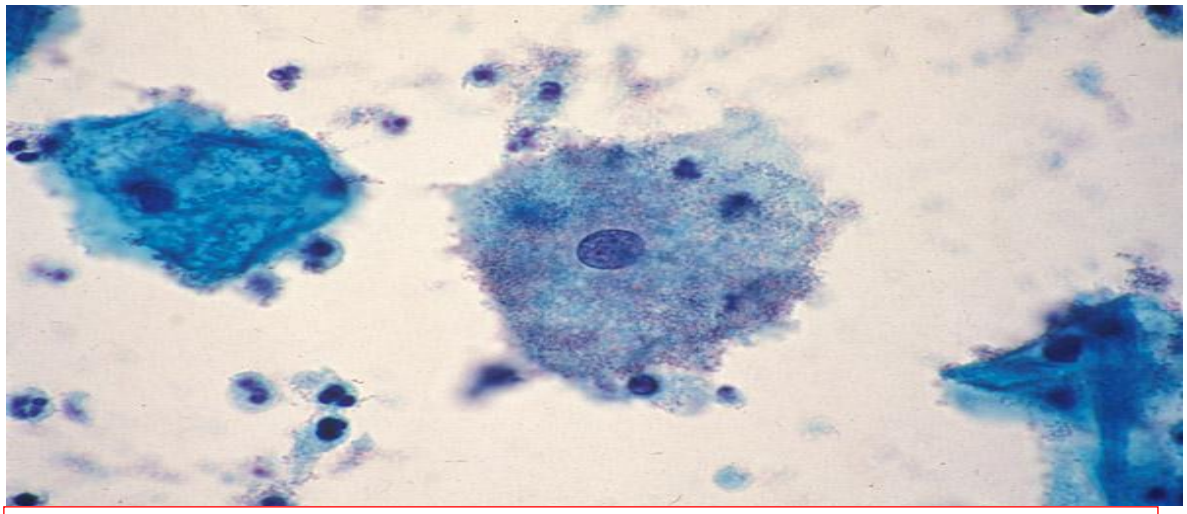


Fig 8 – Clue cells with adherent bacteria

9) Arias Stella Reaction

Seen in **Cervical cytology** in **pregnancy, Gestational Trophoblastic Disease, OCPs or hormone therapy.**

It was first described by a Peruvian pathologist, **Javier Arias Stella** who found it to be a reaction of endometrium cells to hormones.

The **Arias-Stella reaction** is a hormone-related atypical endometrial change characterized by **hypertrophy and vacuolization** of glandular epithelial cells, associated with marked **nuclear pleomorphism, enlargement, and hyperchromasia**. It is believed to be hormone related due to combined effect of **progesterone and estrogen** [5,7]**.**

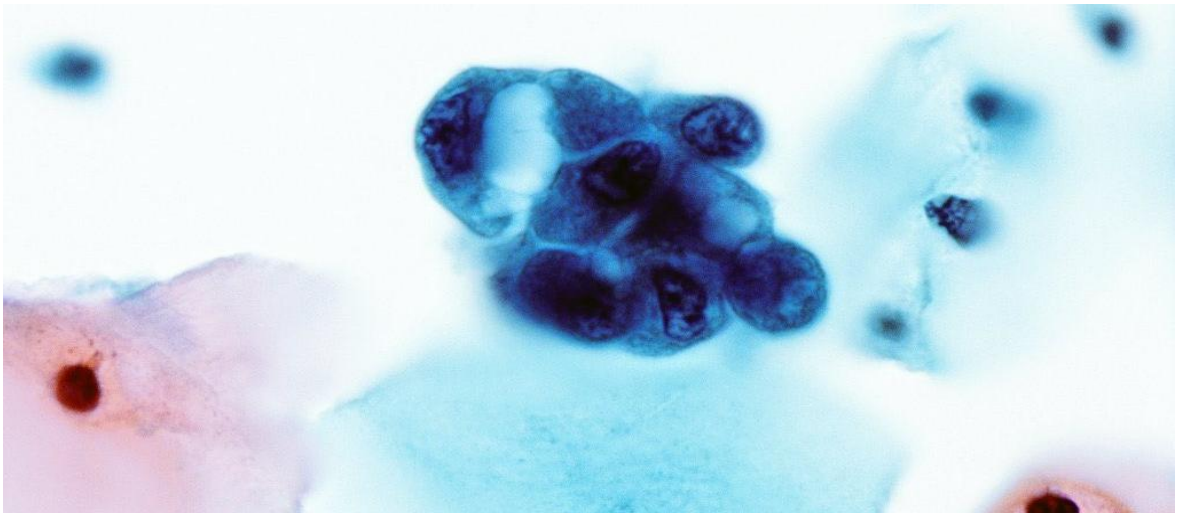


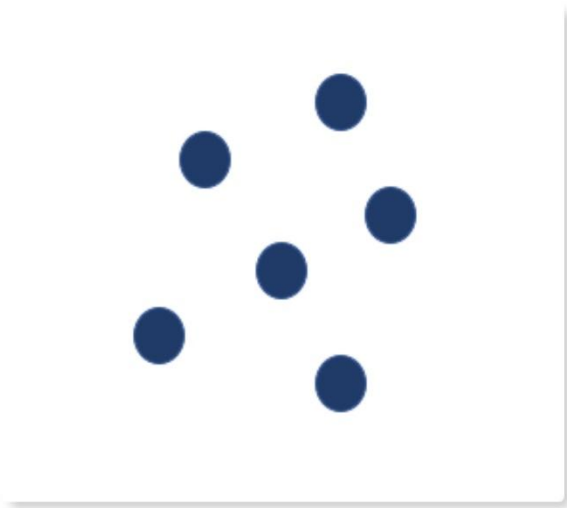
Fig 9 – Arias-Stella reaction in endometrial cells

10) Blue blobs

Seen in **Cervical Cytology** in an **Atrophic smear**

Blobs represent a small drop of viscous material with no internal structure**[Fig 10 A]**.

Blue blobs represent **parabasal/intermediate** cell in varying stages of degeneration. It is **PAS positive** and is negative for mucicarmine and calcium, characteristically seen in **Atrophic smear [Fig 10B]**[5,7].



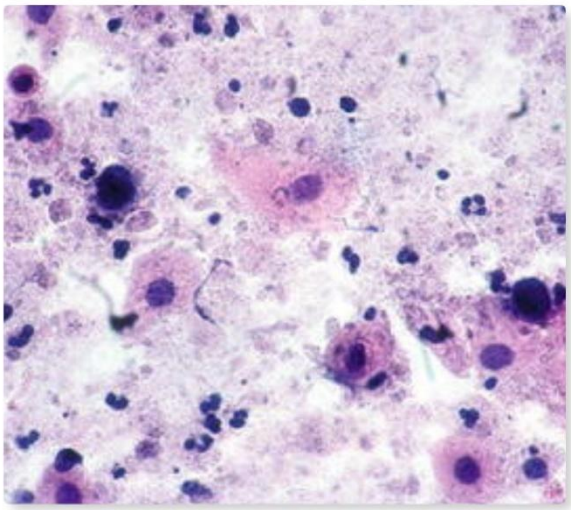


Fig 10A – Blue coloured blobs

Fig 7B – Blue blobs in a PAP smear

11) Corn flaking

Seen in **Cervical cytology** in **squamous cells** due to **insufficient dehydration.**

Cornflake artifacts are artifacts that commonly occur when the mounted medium starts to evaporate before cover slipping and also when there is **poor dehydration [Fig 11A-B]**[5,6,7].

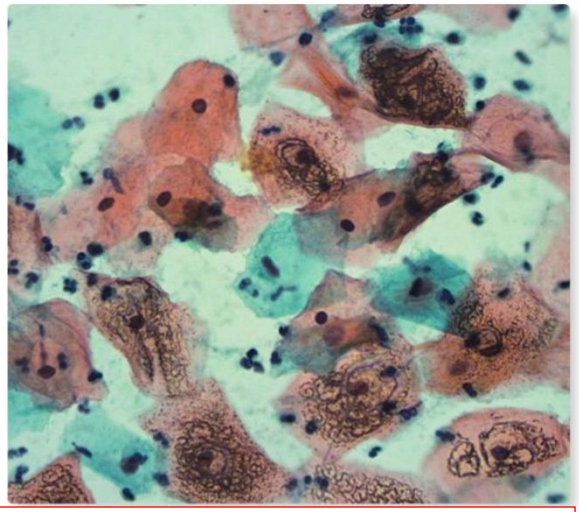
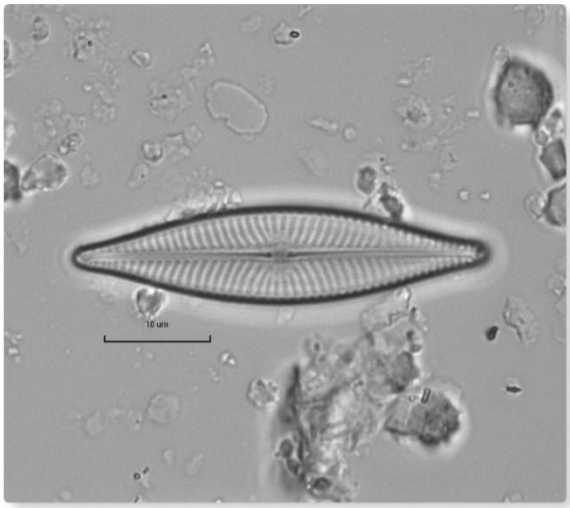


Fig 11A – Cornflakes Fig 11B – Corn flaking artifact in PAP smear

12) Navicular cells

Seen in Cervical cytology in pregnancy and contraception with medroxyprogesterone acetate.

Navicula is a Latin word which means a '**small ship**.' Navicula is also an **alga with the shape of ship [Fig 12A].** **Navicular cells** are **intermediate cells** seen in cases of pregnancy having **folded edges** with a **thickened outer rim** of cytoplasm and an **eccentric nucleus [Fig 12B].** They contain abundant glycogen in the cytoplasm, giving it a central yellow halo. The cytoplasm appears golden, refractile and granular under the microscope[4,7].



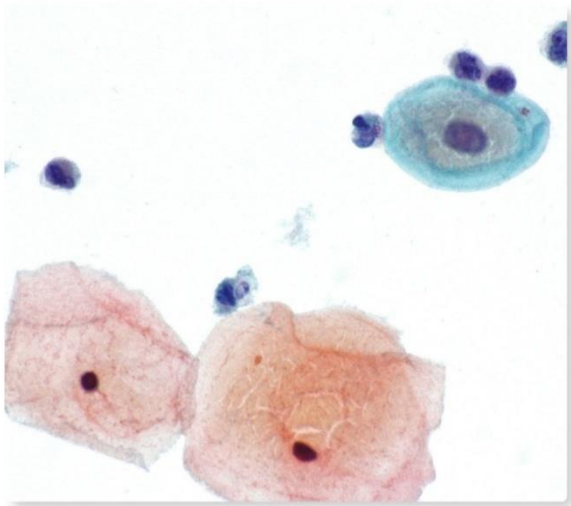


Fig 12A – Navicula alga Fig 12B – Navicular cells in PAP smear

13) Ground glass inclusion

Seen in **Cervical Cytology** in patients infected with **Herpes Simplex Virus**

Ground glass is a glass whose surface has been ground to produce a **matte finish** to the glass**[Fig 13A]**.

Ground glass inclusion with **margination of chromatin** is typical of cytopathic effects seen in **squamous cell** infected with **Herpes Simplex Virus [Fig 13B]**[6,7].

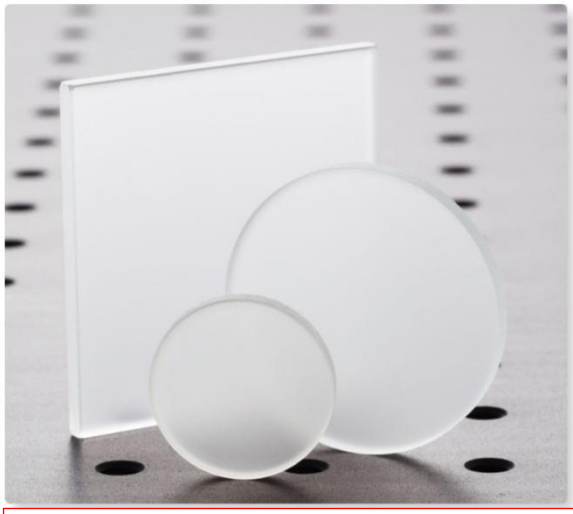


Fig 13A – Ground glass

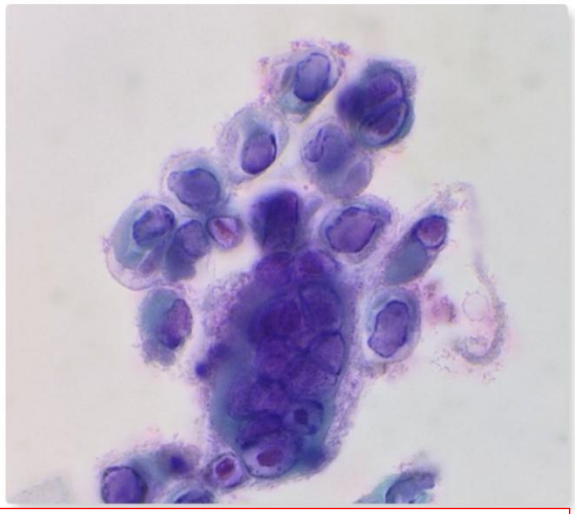


Fig 13B – Ground glass inclusion in HSV infected cell

14) Spider like cells

Seen in **Cervical Cytology** in **Squamous metaplasia**.
Spider is an insect with **multiple legs**.
Squamous metaplastic cells are **Endocervical Cells [EC]** which undergo **metaplastic change**. Depending upon the level of cell maturation, amount and character of cytoplasm varies. **Spider like extension of cytoplasm** in these cells is usually seen in immature meta plastic cells.

Fig 14A – Spider

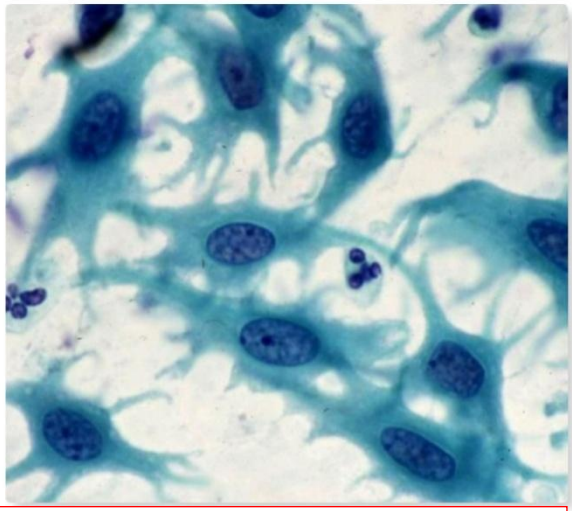
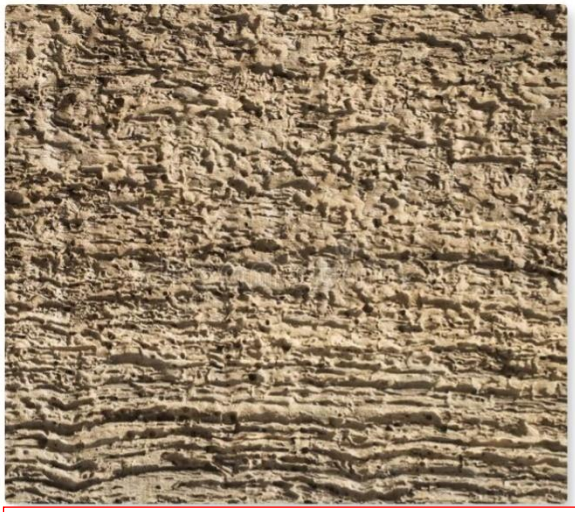


Fig 14B –EC cells showing squamous metaplasia

15) Moth eaten appearance

Seen in **Cervical Cytology** in patients infected with **Chlamydia trachomatis** and **Trichomonasvaginalis.**
Moth feeds on tree trunks giving it a **feathery** or a **texture like appearance [Fig 15A]**.
Fine vacuolation due to infection caused by **Chlamydia trachomatis and Trichomonasvaginalis** in Squamous Metaplastic cells gives a **moth-eaten appearance [Fig 15B]**[6,7]**.**



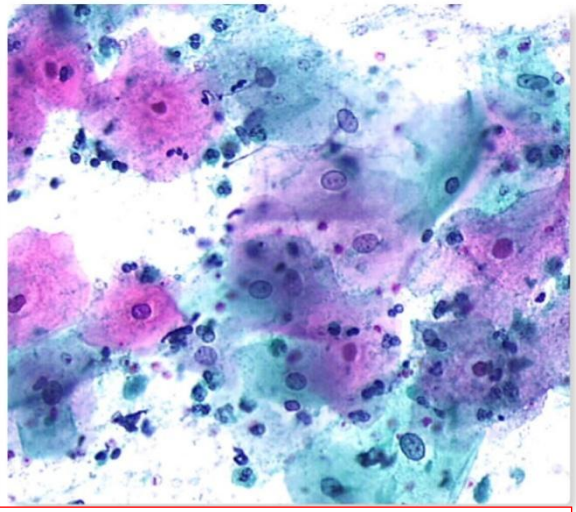


Fig 15A – Tree trunk eaten by Moth Fig 15B – Moth eaten appearance of cells

16) Slippershaped nuclei

Seen in **Epithelioid cell granuloma**.

Slipper shaped nuclei is ovoid shaped with excessive and large area of **golgi cisternae**. It is the **most common shape** of epithelioid cell nucleus seen in Granulomatous inflammation [8].

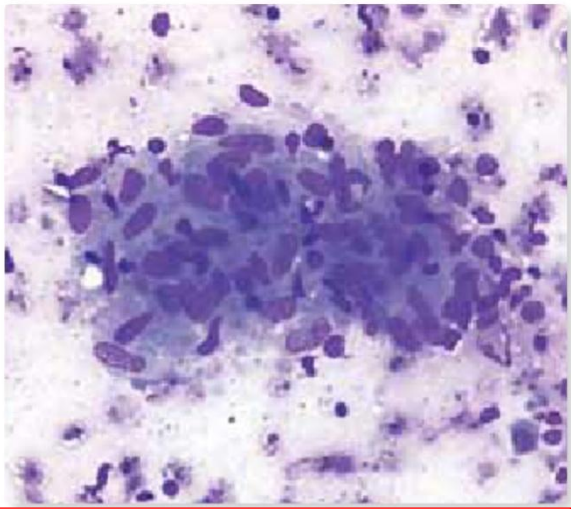


Fig 16A – Slipper Fig 16B – Slipper shaped Epithelioid Cells

17) Boomerang shaped nuclei

Seen in **Epithelioid cell granuloma**.

Boomerang is a device used for playing having a curved or bent structure**[Fig 17A]**.

Boomerang shaped nuclei is another variant of **epithelioid cell** shape seen in Granulomatous Inflammation**[Fig 17B]**[8].

Fig 17A – Boomerang

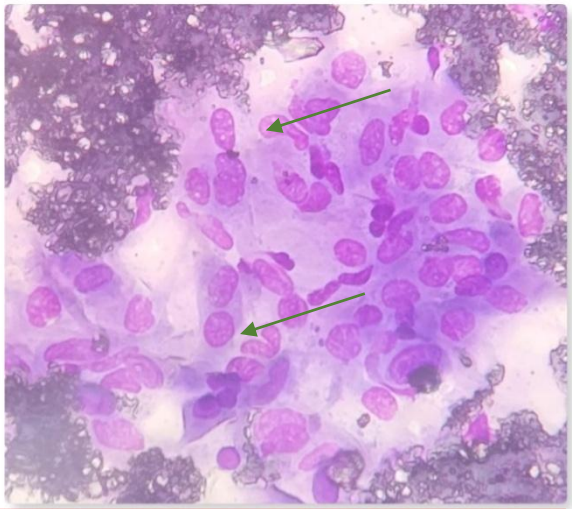


Fig 17B – Boomerang shape Epithelioid cells

18) Salt and pepper chromatin

Seen in **Neuroendocrine Tumors**.

Also called **stippled chromatin**, it is a specific type of chromatin usually seen in **Neuroendocrine tumors**. It represents chromatin pattern comparable to a homogenous mixture of salt and pepper**[Fig 18A]**. Salt and pepper chromatin present in Neuroendocrine tumors represent the **Neurosecretory granules** present in the cell**[Fig 18B]**[9,10].

Fig 18A – Salt & Pepper mixture

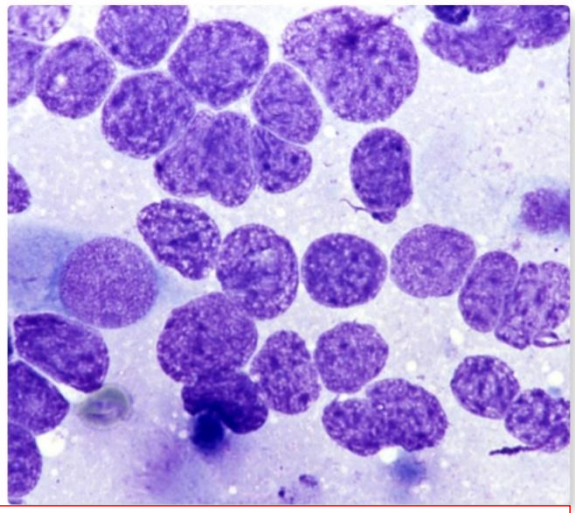


Fig 18B – Salt and Pepper chromatin

19) Hand mirror cell

Seen in cases of **Acute Lymphoblastic Leukemia (ALL).**

The shape of the **lymphoblasts** resemble a **hand mirror**and has a very high nucleocytoplasmic ratio.

A **small cytoplasmic extension** is seen at one pole corresponding to the **uropod**. They are also known as **uropod bearing lymphocytes[Fig 19A-B]**[11].

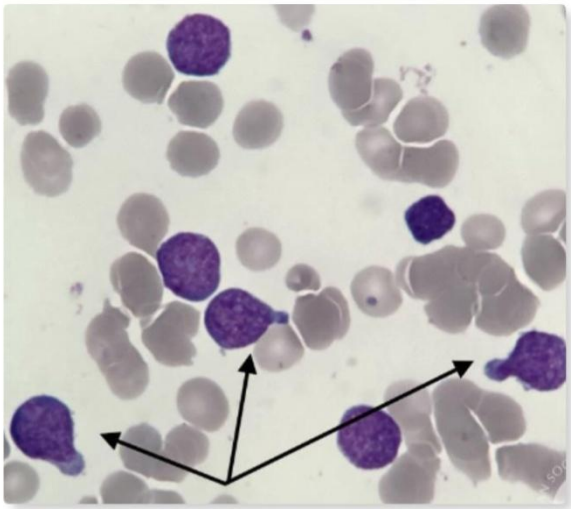


Fig 19A – Hand mirror Fig 19B – Hand mirror lymphoblasts

20) Motor oil fluid

Seen in **Craniopharyngioma** and **Warthintumor**.

The **cysts** in **Craniopharyngioma** as well as **Warthintumor** contain a **dark viscous fluid** rich in proteins, blood, cholesterol, and cellular debris giving it an appearance of **Motor oil or Machinery oil [Fig 20A-B]**[12]**.**

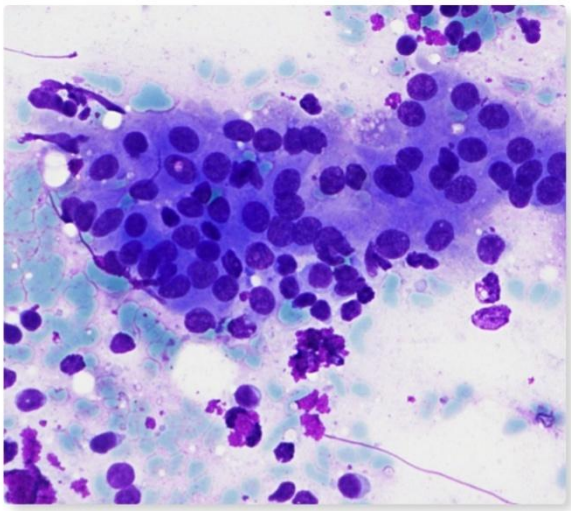


Fig 20A – Motor oil Fig 20B – Motor oil fluid in background

21) Lacy Skirt / Cytoplasmic Blebbing / Two toned cytoplasm / Windowing

Seen in **Mesothelial cells.**

Lacy skirt here is used for its **irregular, frayed border[Fig 21A]**.

Mesothelial cells have **microvilli** at peripheral cell border which gives it an appearance of **lacy skirt having frayed edges**, which are better appreciated under Electron Microscope**[Fig 21B].**They also show areas of intercellular clearing referred to **Mesothelial windows**. It has a characteristic two-toned cytoplasm with **peripheral light ectoplasm** and **inner darker endoplasm** due to **thicker cytoplasm around the nucleus**. Peripheral vacuolation is due to varying amount of glycogen, giving it a foamy appearance**[Fig 21C]**.

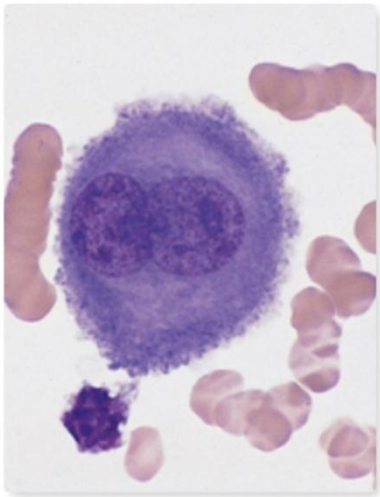
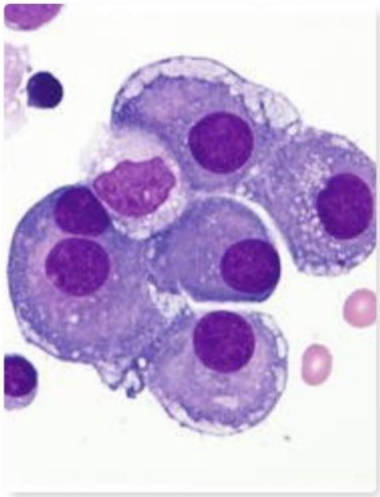




Fig 21A – Lacy skirt Fig 21B-C – Mesothelial cells showing blebbing and windows

22) Flame cells / Fire flares

Seen in thyroid FNACs in thyrotoxic goitre.

They are known as **fire flares** because they resemble a **spreading fire**. Ultra structurally they are **vacuoles of dilated Endoplasmic Reticulum**and are a result of **pinocytosis of thyroglobulin** present within the thyroid follicles**[Fig 22A-B]**[13].

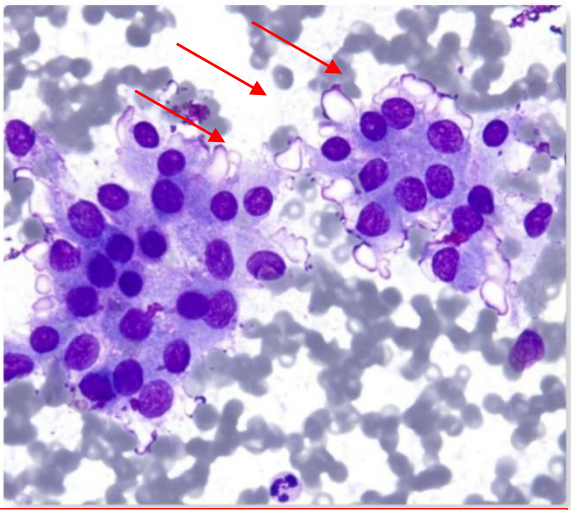



Fig 22A – Fire flare Fig 22B – Flame cells in FNAC of thyroid

23) Bubble gum / Chewing gum Colloid

Seen in **Follicular Variant of Papillary Thyroid Carcinoma**.

This type of colloid is extremely **thick and sticky** and is comparable to a bubble gumbecause it is dense, **homogenously stained and appears as strands [Fig 23A-B]**.

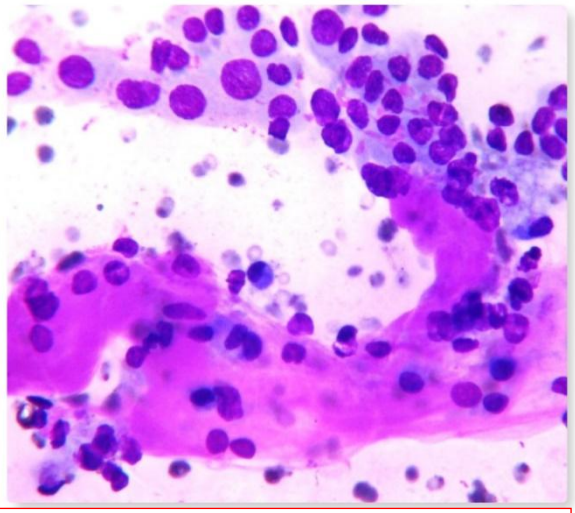



Fig 23A – Chewing gum Fig 23B – Chewing gum colloid

24) Cartwheel chromatin / Russel body / Mott cell / Morula cell

Seen in **Plasma Cells.**

The characteristic **cart wheel or clock face chromatin** is due to the **peripherally located heterochromatin and centrally placed euchromatin [Fig 24A-B].**

Immunoglobulin accumulation in plasma cells can be seen as **large eosinophilic cytoplasmic globules** which are termed as **Russel bodies**. When multiple Russel bodies are present in a Plasma cell, it is called a **Mott cell**, named after a surgeon **F.W. Mott** who first traced these cells in Monkey brains with trypanosomiasis**[Fig 24D]**.

Due to their cytological features similar to the **morula stage** of the developing embryo it is also known as **Morula cell [Fig 24C]** [14]**.**

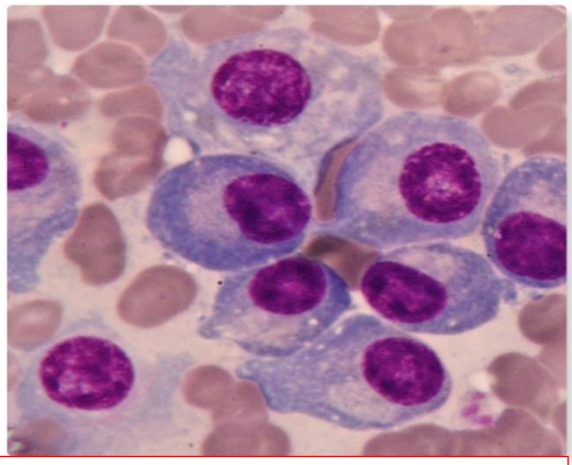
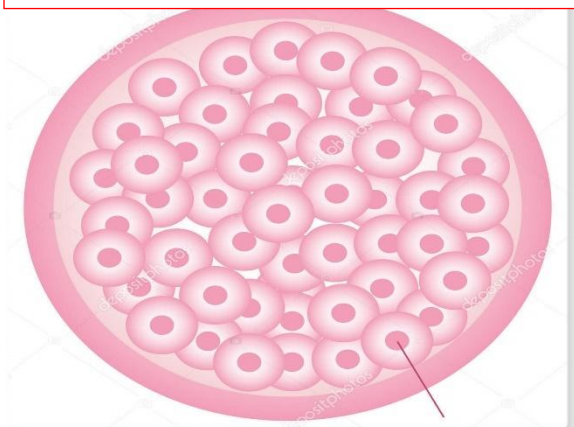


Fig 24A – Cart wheel Fig 24B – Cartwheel chromatin in Plasma cells



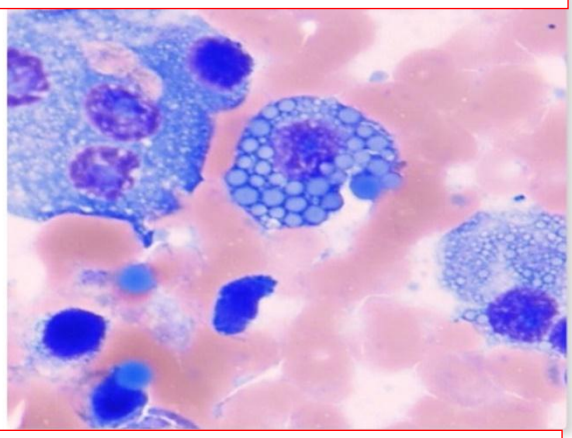


Fig 24C – Morula stage in embryo Fig 24D – Mott cell

CONCLUSION

A pictorial glossary is an interesting way for the budding Pathologists especially the residents to understand the subject of Cytopathology. Pictorial illustrations along with their etymology helps students understand the origin of the words and also the basis of their usage.

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