

SCIENCE & INDUSTRY

# kosmetikos\*

## Where's the Yolk?

The "incredible, edible egg's" useful components...for personal care.

By Steve Herman

*All the king's horses and all the king's men  
Couldn't put Humpty Dumpty together again.  
—Mother Goose*

**H**umpty having broken apart, the interested cosmetic formulator is free to examine the pieces. Egg white protein is available for cosmetic applications. Every part of the egg has useful properties, and a number of them are commercialized for personal care. Natural products provide a fruitful way to study raw material composition, separation processes, and the reactions, which can create useful derivatives.

The CTFD Dictionary includes several egg products, including albumen, egg oil, egg powder, lecithin, egg yolk extract, hydrolyzed egg protein, and egg yolk powder. The food industry is obviously the primary source of these materials.

The citrus oils used in perfumery and the fatty acids used as the source of many cosmetic products are similarly dependent on resources established for dining needs rather than adornment.

Everyone is familiar with the basic components of a hen egg: shell, white, yolk. Figure 1 shows the egg in slightly more detail. Among the less familiar parts, chalazo is a cord-like strand of egg white that anchors the yolk to the center of the egg, and vitelline

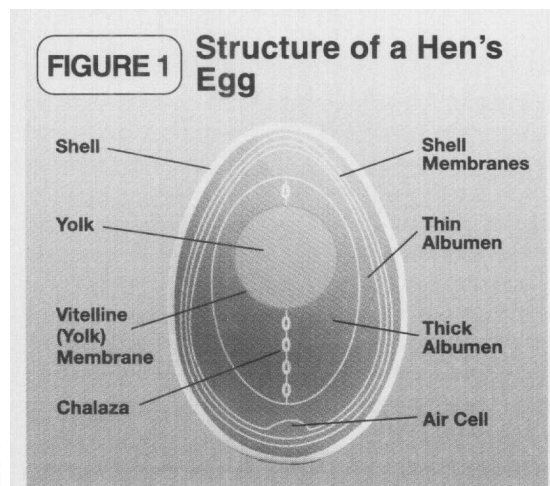
is the membrane that holds the yolk together. The air cell results from the contraction of the egg's contents as it cools after laying.

Separation is done by an-Egg Breaking and Separating Machine! The separators provide the key components of the egg for a variety of uses.



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\*Greek kosmEtikos, skilled in adornment or decorating.



Shells are composed almost entirely of calcium carbonate, which is also produced through mining. The egg shell could be ground and used as an abrasive in cosmetics, but this is not economically feasible. The trace presence of egg protein creates the potential for microbial contamination, and adequate purification is too costly for a product abundantly available from other sources.

The egg white, officially termed albumen, is not white in its native state, but opalescent. Cooking turns it white by denaturing the protein and making it insoluble. Albumen accounts for approximately 67 percent of the egg's liquid weight, and contains more than half of the egg's total protein, niacin, riboflavin, chlorine, magnesium, potassium, sodium, and sulfur.

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Protein composition of albumen is shown in Figure 2. Some of the amino acid distribution

**FIGURE 2** Albumen Protein

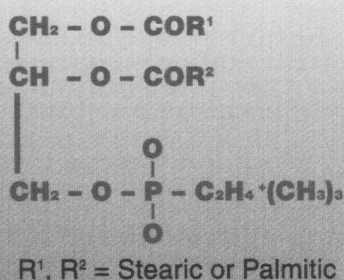
Major Components	%
Ovalbumin	54%
Ovaltransferin	12%
Ovamucoid	11%
Ovamucin	3.5%
Lysozyme	3.4%
G2-Globin	4%
G3-Globin	4%
Ovainhibitor	1.5%

compared to collagen and soy is compiled in Figure 3. In amino acid distribution, soy and albumen resemble each other much more than either resembles collagen. Soy is an important source for materials that might be extracted from egg, particularly lecithin. Frequently,

**FIGURE 3** Comparison of Selected Amino Acids

Amino Acids	Albumen	Collagen	Soy
Alanine	5.85	11.30	4.18
Aspartic acid	10.31	6.60	11.90
Glycine	3.55	27.60	4.12
Glutamic acid	13.46	11.40	19.61
Hydroxyproline	0	14.40	0
Proline	3.94	16.50	5.31
Tryptophen	1.25	0	1.07

**FIGURE 4** Phosphatidyl Choline



alternative natural sources for raw materials exist, but almost always with variations of detailed composition.

Egg white protein and hydrolyzed egg white protein are available for cosmetic use.

(Phoenix Chemical supplies them as

NEOPRO®EW and NEOPRO®HEW.) Ovtransferin can chelate iron and copper, acts as a free radical scavenger, and has antibacterial activity. Lysozyme has bacteriolytic character, and ovoinhibitor is an elastase inhibitor. Thus, egg white and its components has potentially valuable skin treatment properties for new products.

Hydrolyzed egg white with molecular

weight approximately 1,200 daltons (one dalton is the same as one atomic mass unit, which is defined as one-twelfth the mass of one carbon-12 atom) can be used as a film former and to build viscosity in surfactant systems. It can be incorporated into skin or hair-care formulations.

Fanning Corporation supplies egg oil (EmCon™E-5) and albumen (Sol-U-Tein EA). The egg oil has no protein, being 85 percent triglycerides and about 5.5 percent phospholipides. It is an emollient, emulsifier, and occlusive agent. The albumen's principle use is as a binding agent for face packs and tablets.

Yolk contains a material well-known in emulsion applications: lecithin. It is also found in corn and soybeans, and even synthesized by the human liver. Lecithin is more accurately characterized as phosphatidyl choline (Figure 4). Phosphatidyl choline comprises 73 percent of egg yolk, compared to only 29.4 percent of soybean.

Contemporary use of egg products in personal care is generally limited. Many large companies tend to avoid animal-derived materials based on principle. Product lines featuring an "all-natural" image for a niche market are most likely to consider egg-based ingredients.

It could be argued that eggs are not an important source for personal care. The preference for plant rather than animal-derived materials certainly conspires against the egg. Nevertheless, the cosmetic formulator could do far worse on a desert island than to have only an egg to supplement the surrounding water. The abrasives, proteins, enzymes, oils, and emulsifiers present would allow the creation of a spectrum of products. How many other single objects would yield the same wealth of possibilities? ■

## References

Thanks to John Imperante of Phoenix Chemical for valuable background information.

Company literature consulted:

From Phoenix Chemical: *Phenomenon NEOPRO®EW and NEOPRO®HEW Egg White Protein Part I (No. 4309) and Part II (No. 1279).*

From Fanning Corporation: *EmCon™ E-5 and SOL-U-TEIN EA data sheets.*

To research eggs on the Web, start at the American Egg Board at [www.aeb.org](http://www.aeb.org).