

Discovery of genes and pathways related to reproduction of the black tiger shrimp (*Penaeus monodon*) through transcriptome analysis

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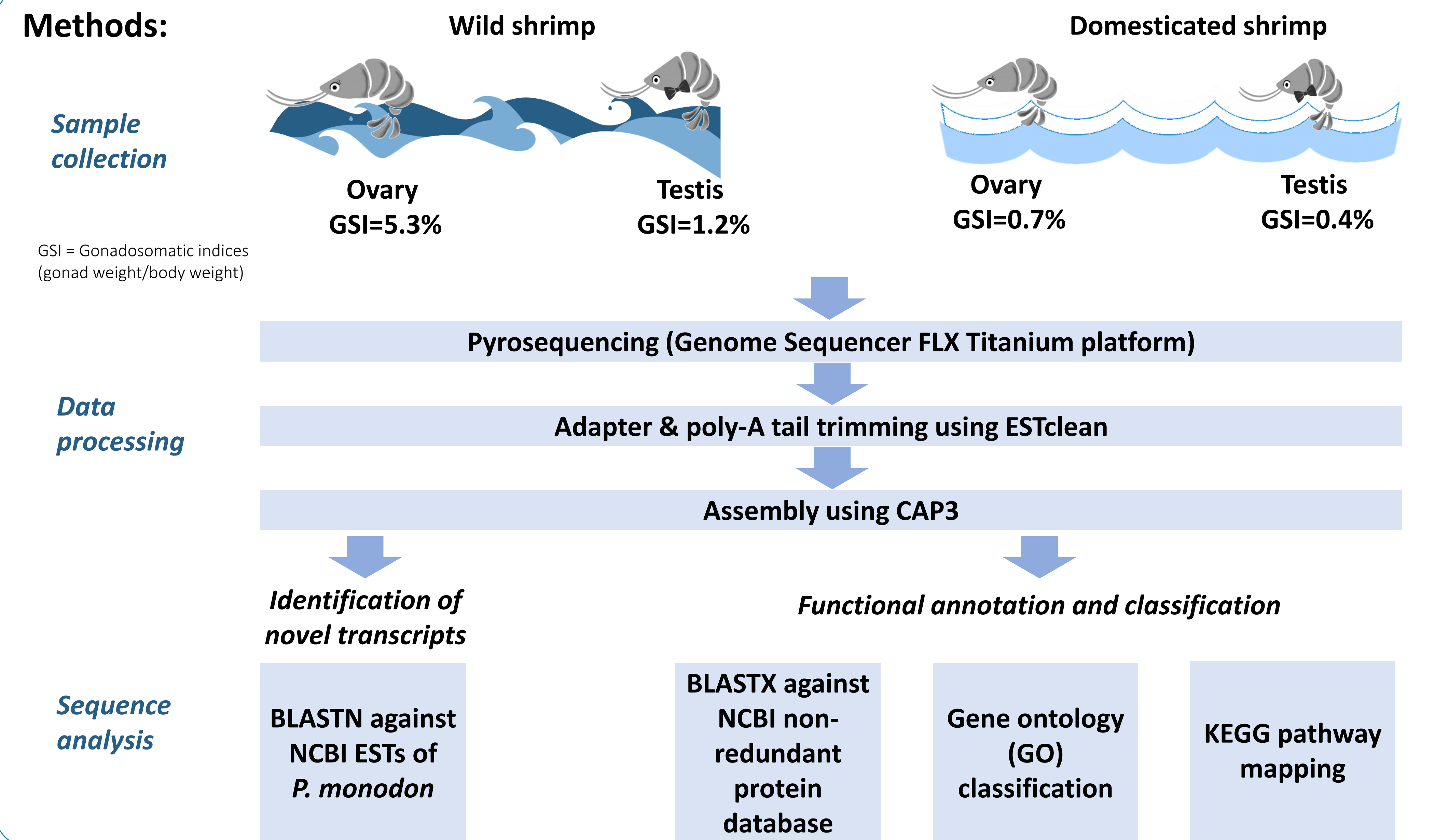
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Abstract:

The black tiger shrimp (*Penaeus monodon*) is a significant aquatic species contributing to global food supply and national economic profit. Poor reproductive maturation in captivity of *P. monodon* has hindered sustainability of the shrimp farming industry. Eyestalk ablation is still a common practice to induce the maturation of female shrimp. To overcome this problem, genetic knowledge of reproduction is essential. In this study, transcriptomic analysis yielded 25,777 and 26,293 transcripts of ovaries from wild and domesticated shrimp, and 9,598 and 9,775 transcripts of testis from wild and domesticated shrimp, respectively. KEGG pathway mapping showed that most genes in pathways related to reproduction such as oocyte meiosis, progesterone-mediated oocyte maturation and gonadotropin-releasing hormone (GnRH) signaling pathway could be filled. For example, identified genes that are essential for reproduction were *GnRH receptor*, *calcium voltage-gated channel* and *epidermal growth factor receptor*. A new putative *vigillin* encoding for an estrogen-induced polysome-associated protein which has not been reported in penaeid shrimp was also identified. The functional genes and pathways identified here provide a valuable genetic resource for understanding reproduction in *P. monodon*.

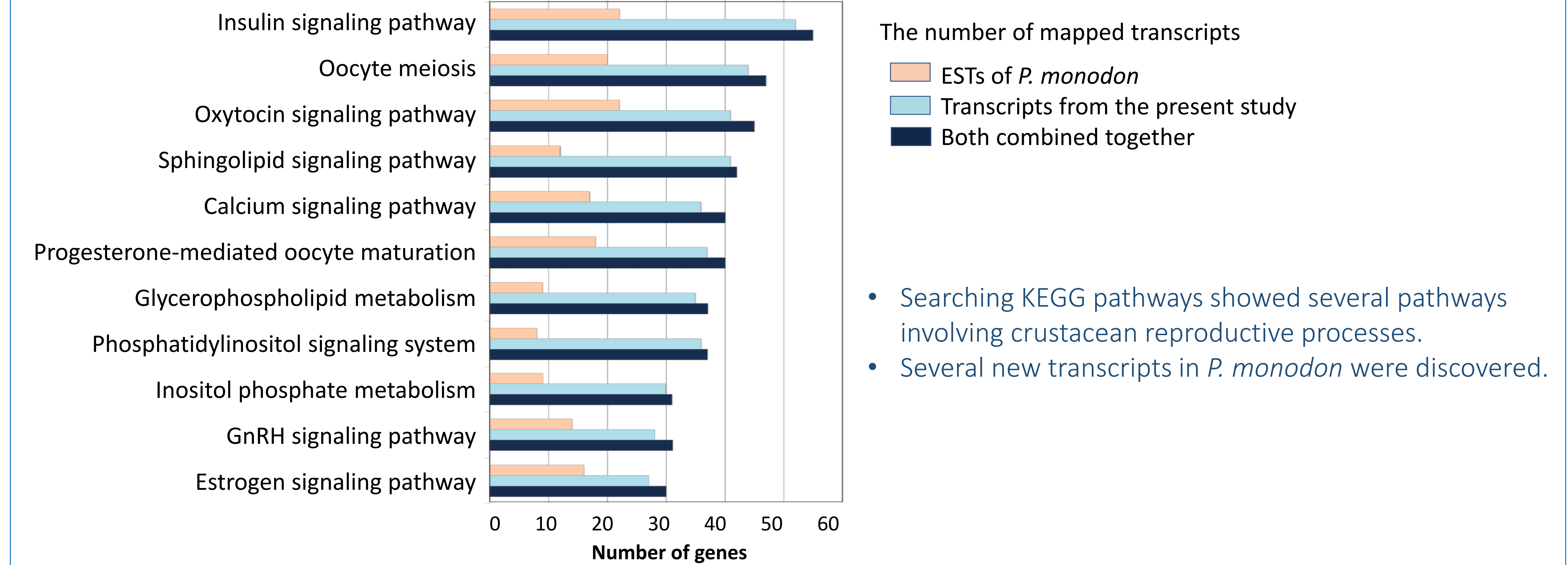
Methods:



Results:

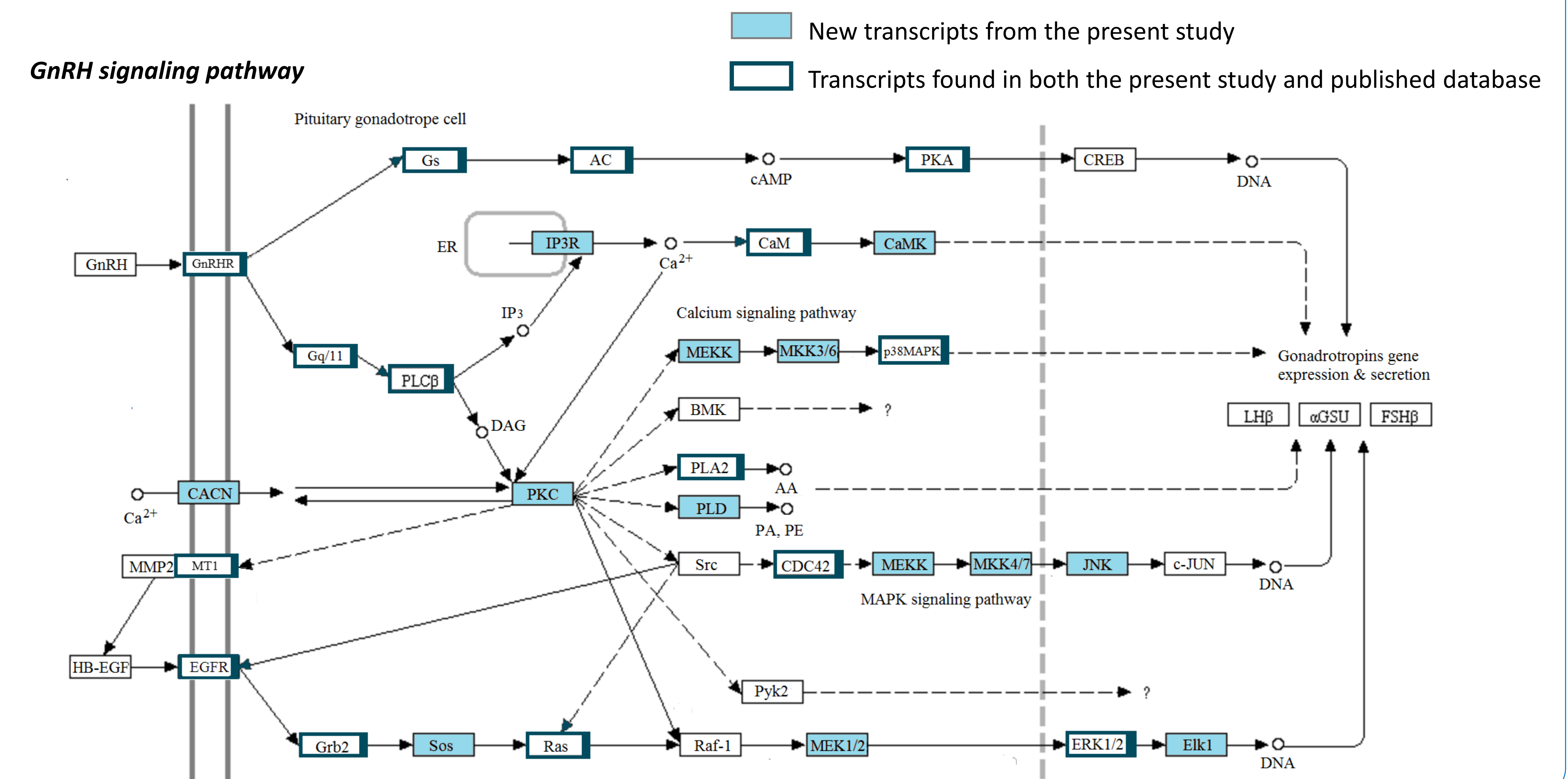
Pyrosequencing	Wild shrimp		Domesticated shrimp	
	Ovary	Testis	Ovary	Testis
Total reads	237,886	252,707	240,550	254,220
Number of assembled transcripts	25,777	9,598	26,293	9,775

Results:



- Searching KEGG pathways showed several pathways involving crustacean reproductive processes.
- Several new transcripts in *P. monodon* were discovered.

- The GnRH signaling pathway has an important role in animal reproductive systems. KEGG pathway mapping reveals 12 potentially novel *P. monodon* transcripts found in the vertebrate GnRH pathway.



Conclusions:

The present transcript data offers baseline information for understanding biological processes underlying the reproduction of *P. monodon*. The identification and mapping of homolog genes in the GnRH signaling pathway suggest that shrimp reproduction might have similar pathways to that described for the vertebrates.

Reference:

Uengwetwanit T, Ponza P, Sangrakru D, Wichadakul D, Ingsriswang S, Leelatanawit R, Klinbunga S, Tangphatsornruang S, Karoonuthaisiri N. Transcriptome-based discovery of pathways and genes related to reproduction of the black tiger shrimp (*Penaeus monodon*). Marine Genomics. 2018;37:69-73.