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# **Ligand to Acquire Crystal Bioscience, the Leader in Chicken-derived Fully-human Antibody Generation, for \$25 Million in Cash plus Additional Potential Payments**

***Gains complementary antibody technology and discovery lab, new revenue streams and four fully-funded partnerships with potential for milestones and royalties***

***Transaction expected to be accretive to revenue and earnings beginning in 2018***

***Ligand's portfolio now has more than 160 fully-funded Shots on Goal***

SAN DIEGO & EMERYVILLE, Calif.--(BUSINESS WIRE)-- **Ligand Pharmaceuticals Incorporated (NASDAQ: LGND) and Crystal Bioscience, Inc.** (Crystal) announce the signing of a merger agreement whereby Ligand will acquire Crystal, a leader in avian genetics and the generation of fully-human therapeutic antibodies. Under the terms of the agreement, Ligand will pay Crystal shareholders \$25 million in cash at closing, up to an additional \$10.5 million of success-based milestones, and revenue sharing from existing licensees for a defined period.

Crystal is a leader in the difficult-to-address-epitope area of antibody research with its HuMab technology, which is believed to be the world's only chicken-based human antibody platform to successfully generate human antibodies. As part of the OmniAb® brand, HuMab technology will be called OmniChicken™. Because of the evolutionary distance between birds and mammals, chickens enable the generation of novel antibodies against targets that are not immunogenic in mammals like mice and rats, the core species of Ligand's existing OmniAb platform. The addition of the OmniChicken platform will be complementary to Ligand's OmniAb technology, and further solidifies Ligand's position as the world leader in novel, transgenic antibody discovery platforms.

Crystal's license agreements will initially add four Shots on Goal to Ligand, bringing its fully-funded programs to more than 160. It is expected that the OmniChicken technology will be utilized by some of Ligand's existing OmniAb partners and potential new partners. Crystal's current licensees include Boehringer Ingelheim, Alexo Therapeutics, Achaogen, and an undisclosed large pharmaceutical company, most of which are pursuing multiple targets. This transaction also provides Ligand with an in-house antibody discovery laboratory to service OmniChicken R&D needs through contracted service.

Rob Etches, PhD, DSc, a Crystal co-founder and distinguished geneticist, is expected to join Ligand as Vice President, Antibody Technologies, further strengthening Ligand's R&D leadership in the field of antibody research. Ligand will continue to operate the 19-person

Crystal organization based in Emeryville, CA.

“Crystal is an excellent, complementary addition to our OmniAb antibody discovery platform. The company adds a third species for fully-humanized antibody discovery for partners, four new fully-funded partnerships and projected growing annual revenue and positive cash flow to the business,” said John Higgins, Chief Executive Officer of Ligand Pharmaceuticals.

“Species diversification is very important in antibody discovery due to the expanding complexity of therapeutic targets being pursued by the industry, and given that not all species of animals will yield the same results,” he added. “In less than two years, Ligand has assembled the world’s premier offerings of fully-human antibody discovery technologies based on number and variety of species, and the highest number of partners broadly deploying the platform. Antibody research is one of the largest areas of R&D investment by the pharma and biotech industries given the potential and medical impact for major new medicines. Ligand is now offering prospective partners a one-stop shop with its trademarked ‘Three Species, One-License’ OmniAb partnering opportunity. Ligand will continue to operate the highly-specialized and profitable Crystal research unit out of its current labs in Northern California.”

### **Ligand Pro Forma 2017 and 2018 Financial Outlook**

This acquisition is projected to contribute up to \$1 million of revenue and a similar level of operating expenses during the fourth quarter of 2017. For 2018, Ligand expects incremental Crystal revenues of at least \$5 million and incremental EPS of at least \$0.09.

Including this acquisition, Ligand now expects 2017 total revenues to be at least \$134 million with the potential for an additional \$9 million of contract payments. Ligand estimates that with revenue of \$134 million, adjusted earnings per share would be approximately \$2.93.

Crystal non-cash amortization expense estimates are expected to be determined in the near term. Amortization charges will be recognized in GAAP EPS and the non-cash charge will be excluded from adjusted EPS.

### **About Crystal Bioscience**

Crystal Bioscience is a privately-held company that was founded in 2008 to develop a therapeutic antibody discovery engine using chickens. Its platform relies on the large phylogenetic distance between mammals and birds to generate a diverse array of antibodies to human targets that have proven intractable in mammalian and other discovery platforms.

Crystal’s patented platform provides the ability to isolate monoclonal antibodies from immunized chickens, and can screen simultaneously for specificity and biological activity. It has led to the discovery of bioactive monoclonals directed against difficult targets, including G-protein-coupled receptors (GPCRs) and ion channels. Chicken antibodies often recognize both human and mouse orthologs, which can simplify early stages of drug development where rodent disease models are often used.

The depth of screening provided by Crystal’s Gel Encapsulated Microenvironment (GEM) assay in combination with the breadth of the antibody repertoire in immunized birds provides access to a broad source of affinity matured antibodies with therapeutic potential. Crystal’s

HuMab chickens, which are genetically engineered to yield fully human sequence mAbs, capture the attributes of the chicken repertoire in a format with therapeutic potential.

### **About OmniAb®**

OmniAb includes three transgenic animal platforms for producing mono- and bispecific human therapeutic antibodies. Ligand's OmniAb platform is the world's leading antibody discovery platform technology featuring the highest number of unique species for drug discovery work and has more users than any other human antibody platform. OmniAb is positioned for partnering with the trademarked "Three species, one license" motto.

OmniRat® is the industry's first human monoclonal antibody technology based on rats. It has a complete immune system with a diverse antibody repertoire and generates antibodies with human idiotypes as effectively as wild-type animals make rat antibodies. OmniMouse® is a transgenic mouse that complements OmniRat and expands epitope coverage. OmniFlic® is an engineered rat with a fixed light chain for development of bispecific, fully human antibodies. The three platforms use patented technology, have broad freedom to operate and deliver fully human antibodies with high affinity, specificity, expression, solubility and stability.

### **About Ligand Pharmaceuticals**

Ligand is a biopharmaceutical company focused on developing or acquiring technologies that help pharmaceutical companies discover and develop medicines. Our business model creates value for stockholders by providing a diversified portfolio of biotech and pharmaceutical product revenue streams that are supported by an efficient and low corporate cost structure. Our goal is to offer investors an opportunity to participate in the promise of the biotech industry in a profitable, diversified and lower-risk business than a typical biotech company. Our business model is based on doing what we do best: drug discovery, early-stage drug development, product reformulation and partnering. We partner with other pharmaceutical companies to leverage what they do best (late-stage development, regulatory management and commercialization) to ultimately generate our revenue. Ligand's Captisol® platform technology is a patent-protected, chemically modified cyclodextrin with a structure designed to optimize the solubility and stability of drugs.

OmniAb® is a patent-protected transgenic animal platform used in the discovery of fully human mono- and bispecific therapeutic antibodies. Ligand has established multiple alliances, licenses and other business relationships with the world's leading pharmaceutical companies including Novartis, Amgen, Merck, Pfizer, Celgene, Gilead, Janssen, Baxter International and Eli Lilly.

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### **Forward-Looking Statements**

This news release contains forward-looking statements by Ligand that involve risks and uncertainties and reflect Ligand's judgment as of the date of this release. Words such as "plans," "believes," "expects," "anticipates," and "will," and similar expressions, are intended to identify forward-looking statements. These forward-looking statements include, without limitation, statements regarding: the benefits of the acquisition of Crystal, the expected timing of the completion of the transaction, the expected revenues and expectations that the

acquisition will be accretive to revenues and adjusted EPS, future financial and operating results of Crystal and Ligand, the number of partners to be added to Ligand's portfolio due to the acquisition, growth in the number of products in Ligand's portfolio, Ligand's future revenues and other projected financial measures, expected value creation for shareholders and guidance regarding full-year 2017 and 2018 financial results. Actual events or results may differ from Ligand's expectations. For example, various closing conditions for the transaction may not be satisfied or waived, including risk that a governmental entity may prohibit, delay or refuse to grant approval for the consummation of the transaction, or the terms of such approval. In addition, Crystal's partners are able to terminate its partnership agreements for convenience, which may reduce the number of our shots on goal. The number of shots on goal may not be independent if one of Crystal's partner's programs fails due to a problem related to the Crystal platform. Further, we believe that Dr. Etches is critical to the success of the Crystal business and the loss of his services would adversely impact the success of the Crystal business after the transaction. With regards to Ligand's pro forma projections, Ligand may not receive expected revenue from material sales of Captisol, expected royalties on partnered products and research and development milestone payments. Ligand and its partners may not be able to timely or successfully advance any product(s) in its internal or partnered pipeline. In addition, there can be no assurance that Ligand will achieve its guidance for 2017 or 2018 or any portion thereof or beyond, that Ligand's 2017 revenues will be at the levels or be broken down as currently anticipated, that Ligand will be able to create future revenues and cash flows by developing innovative therapeutics, that results of any clinical study will be timely, favorable or confirmed by later studies, that products under development by Ligand or its partners will receive regulatory approval, that there will be a market for the product(s) if successfully developed and approved, or that Ligand's partners will not terminate any of its agreements or development or commercialization of any of its products. Further, Ligand may not generate expected revenues under its existing license agreements and may experience significant costs as the result of potential delays under its supply agreements. Also, Ligand and its partners may experience delays in the commencement, enrollment, completion or analysis of clinical testing for its product candidates, or significant issues regarding the adequacy of its clinical trial designs or the execution of its clinical trials, which could result in increased costs and delays, or limit Ligand's ability to obtain regulatory approval. Further, unexpected adverse side effects or inadequate therapeutic efficacy of Ligand's product(s) could delay or prevent regulatory approval or commercialization. In addition, Ligand may not be able to successfully implement its strategic growth plan and continue the development of its proprietary programs. The failure to meet expectations with respect to any of the foregoing matters may reduce Ligand's stock price. Additional information concerning these and other risk factors affecting Ligand can be found in prior press releases available at [www.ligand.com](http://www.ligand.com) as well as in Ligand's public periodic filings with the Securities and Exchange Commission available at [www.sec.gov](http://www.sec.gov). Ligand disclaims any intent or obligation to update these forward-looking statements beyond the date of this release. This caution is made under the safe harbor provisions of the Private Securities Litigation Reform Act of 1995.

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Ligand Pharmaceuticals Incorporated  
Todd Pettingill  
(858) 550-7500

[investors@ligand.com](mailto:investors@ligand.com)

@Ligand\_LGND

or

LHA Investor Relations

Bruce Voss

(310) 691-7100

[bvoss@lhai.com](mailto:bvoss@lhai.com)

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